The
Chemical Age

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Heavy Chemicals, U.S. & U.K.

THE latest Anglo-American Productivity Report—'Heavy Chemicals'—maintains that very high standard of objectivity and co-operative (rather than odious or envious) comparison which has made all these reports so valuable. However, this is an excessively documented age in which a good report is only a good report, and what matters is not whether it is widely read in the next few weeks but whether it is still being read (and re-read) in a year or two's time. Indeed, we ourselves could perhaps be of better service to the industry were we to ignore the report completely until, say, mid-1954, and then (when perhaps too many will have filed and forgotten it) to devote an entire issue to it. We make these observations because this Heavy Chemicals report is super-saturated with recommendations and it can have a most stimulating and long-term impact upon the chemical industry here. Yet at the same time it need not give us an inferiority complex about our own progress in post-war chemical manufacture.

The team that visited America last March failed to make truly reliable comparisons between British and American productivity. In the United States they found an abundance of statistics on most branches of chemical manufacture but 'comparisons cannot be made between two sets of facts if only one set is known.' The long-lingering atmosphere of secrecy in our own chemical industry has resulted in a paucity of data, and the plain truth is that British productivity cannot be measured let alone compared. One of the many recommendations is that the A.B.C.M. should consider setting up a joint committee with interested Government departments with the object of making more statistical information available.

Sulphuric acid (from sulphur) had to be taken as the 'sample' for it was the only heavy chemical common to both national industries for which British data were adequately known. The capacities of British plants were very much smaller than those of American plants, and this alone is a disparity of circumstance that makes comparisons misleading. Measured as 'tons of like product per man-year,' American productivity is twice that of Britain. But

measured ' by the percentage return on capital investment,' the two ' productivities ' are about equal. But somewhat similar conclusions would be drawn if in the same country the productivity of a large plant was compared with that of a small one.

It seems preferable to ignore precise numerical comparisons and to rely instead upon the team's impressions. It matters nothing if this tends to involve a comparison of best American practice with average practice here; good examples are always worth examination whether across the road or across the Atlantic. One unanimous opinion of the team was that ' the productivity of many American heavy chemical factories, if measured by the added value per employee, or by the sales value per employee, is at present at least three times that of the British on the basis of the present rate of exchange.' But the investment in capital equipment per employee is some two or three times that in the British industry, again on the same exchange basis of comparison. Nevertheless, when a list of ten chemicals is given the British ex-works basis price is lower than the American price for eight of them, including liquid chlorine, nitric acid, caustic soda, and hydrochloric acid.

In this report as in others the American life-force of ' keeping up with the Joneses ' is noted. There is greater and older wisdom in keeping up with the Joneses only when the Joneses have their best moments. For example, in the U.S. industry there is one technically qualified employee to every six workers; our ratio is 1 to 16. An increase in technical employees in British chemical factories is recommended as a primary requirement for attaining the highest rate of increase in productivity. There is far more inducement for workers in the U.S. industry by means of promotion and differential rates of pay for greater responsibilities. Though the team saw nothing that was new to them in the way of instrumentation and automatic control, it is clear that much wider use is made of these techniques than is the case here. In America shift-work analytical control is much more common, and serious losses are avoided by the rapid detection of departures from normal. The team recommends that we should recruit non-graduate analysts for this purpose, a commendable example of ' keeping up with the Joneses ' within the resources of one's own environment. It seems fair to say that we can borrow many of the best practices of U.S. industry by a change in outlook and not by adopting an annual rate of capital expenditure that in our own economic environment is (a) impossible, and (b) probably suicidal.

On Other Pages

The annual subscription to THE CHEMICAL AGE is 42s. Single copies, 1s.; post paid, 1s. 3d. SCOTTISH OFFICE: 116 Hope Street, Glasgow (Central 3954/5). MIDLANDS OFFICE: Daimler House, Paradise Street, Birmingham (Midland 0784/5). THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Benn Brothers Limited.

Notes & Comments

Norwegian Progress

AN American report (*Chemical and Engineering News*, 1952, **30**, 51, 5,379) suggests that Norway's chemical industry—and her exports in particular—are likely to expand rapidly from now onwards. Hitherto, Norway as a chemical exporter has made herself mainly felt within the narrow range of her electrochemical products—nitrates, cyanamide, ferromanganese, calcium carbide, etc. Expansion is bringing Norway new interests—magnesium metal, polyvinyl chloride, and trichloroethylene. Fish oil products have been greatly extended in range; today 14 firms are producing fatty acids. There are important plans for developing by-products from the wood pulp industry. Formaldehyde, acetaldehyde and paraldehyde, butyl alcohol and acetate, octyl alcohol, dioctyl phthalate, and acetic acid are all mentioned. Halogenated organic chemicals will be increasingly produced to utilise waste chlorine from electrolytic plant processes. As for finer and more complex chemicals, ACTH is already being made from the pituitary glands of whales.

Advantageous Position

AT the present time Norway exports twice as much chemical material as she imports. Not illogically, therefore, Norway favours tariff removals or reductions. Her competition in world markets will not be slightly felt. It is often said that the supply of electric power matters more than its price but Norway has long enjoyed both plenty and cheapness in this respect and her home cost of nitrogenous fertiliser, for example, is the lowest in the world. Chemical by-products from her wood-pulp and fishing industry wastes together with a widening of her electrochemical output must give Norway a highly advantageous position in a number of fields of export. The current plans for chemical expansion are shrewdly based upon the most thorough utilisation of natural resources.

On Washing Eggs

THE shortest experience of keeping poultry teaches even the most adulant nature-worshipper that eggs are seldom found with clean shells. The domestic keeper washes and wipes the eggs clean and the problem is over. It is far from the same simple case with commercial egg production. In cold storage a high percentage of eggs 'rot.' As much as 30 per cent have been known to rot during refrigerated transport from Australia. Research in America, Australia, and here has shown that eggs that have been washed are more likely to rot than eggs that have not. Any wet process for washing the shells damages the anti-bacterial protection of the shell, and the subsequent entrance of rotting organisms is made much easier. Indeed, the washing process very often provides the bacteria as well for where tubs or washing machines are used the water used for treating a batch of farm eggs gradually accumulates egg-rotting bacteria. The problem is a large-scale one. The need for cleaning eggs varies with the system of egg production. Hens in the fold or farm-yard produce most of their eggs in dirty condition; the proportion soiled is much less in the battery system, for example. In this country most of the eggs laid are produced under conditions that favour shell-soiling and as a result most have to be cleaned. The most common method used is washing, though dry cleaning with sand or with an abrasive material like steel-wool would be far preferable.

A Chemical Answer

A CHEMICAL solution seems to have been found in the United States. The dry-cleaning methods have been used there but the labour involved has made them hopelessly uneconomic. It has new been found that the washing method is less dangerous if the water temperature

is kept higher than the internal temperature of the eggs; there is then no shrinkage due to cooling and the risk of drawing in water and bacteria is lessened. Secondly, the water must contain a germicide to ensure that no build-up of dangerous bacteria occurs. Third, a detergent substance should be used to ensure that the dirt is removed speedily. As a result, a formulated product combining a synthetic detergent with a quaternary ammonium germicide is now rapidly entering the U.S. agricultural chemical business. Three features have been specially developed in the formulation: non-corrosive nature as it must mainly be used in metal tanks or tubs; freedom from a tendency to leave a deposit on the shells; and, last, a balance between the detergent and germicidal make-up so that the washing efficiency is certain to vanish before the germicidal effectiveness is lost. As the Ministries of Food and Agriculture and the DSIR are currently said to be investigating the egg-cleaning problem, it is to be hoped that this chemical approach is being given adequate attention.

IN THE EDITOR'S POST

Organo-Tin Stabilisers

SIR,—We were interested to read on page 5 in THE CHEMICAL AGE for 3 January an article on organo-tin compounds and stabilisers as used for stabilising chlorinated transformer oils. In this article your correspondent says that as oils of this type are not made in Great Britain not much is therefore known here about this field of usage.

In actual fact, Monsanto Chemicals, Ltd., have, since 1951, been manufacturing chlorinated diphenyls at their Newport factory. These materials are sold under the trade-name 'Aroclors' and their use as dielectric media and as constituents of non-inflammable transformer coolants is under development by this company. 'Pyroclor,' a synthetic coolant of this type, does in fact contain an organo-tin stabiliser.—Yours faithfully,

W. D. GARNER,
Press Officer, Monsanto Chemicals, Ltd.

ARC Report on Krilium

Initial Findings Inconclusive

DURING 1952 experiments have been made with Krilium by several Agricultural Research Institutes in this country (including Rothamsted, Long Ashton, the John Innes Horticultural Institution, the Experimental and Research Station, Cheshunt, and the National Vegetable Research Station) and by the National Agricultural Advisory Service. The substance used was supplied by Monsanto Chemicals Ltd. as Krilium (CRD.189) and described as a sodium salt of polyacrylic acid. This was the earliest available soil conditioner and in its original form proved somewhat difficult to incorporate in moist British soils.

The results of the 1952 experiments have now been examined; they were not expected to be more than preliminary because there are still many questions to be answered. For example, it is particularly necessary to know how long the effect of soil conditioners persists in the soil. No definite conclusions, therefore, can be drawn at this stage of investigation.

In view of the current interest in the subject, however, the initial findings have been summarised by the ARC as follows:

(1) Improvement in structure after treatment was apparent in many of the soils tested.

(2) The uptake by plants of major and minor nutrients was not adversely affected.

(3) The activity of soil micro-organisms was normal.

(4) No conclusive evidence was obtained that the application of Krilium caused any significant increases in crop yields of field or of glasshouse crops, though in certain cases increased yields were recorded. Much more experimental evidence on the best method of incorporation, degree of aggregation and persistence of structure of treated soils, and the relation of these to crop yields is required before any definite conclusion can be reached.

Towards the end of the year Monsanto Chemicals Ltd. made available a new soil conditioner, described as a calcium salt of vinyl acetate—maleic acid copolymer. This was found to be more easily incorporated in soil and is stated to have better soil aggregating properties than CRD.189.

Experiments will be continued in 1953 and the results published.

U.K. & U.S. Heavy Chemical Industries

Productivity Team's Report Recommendations

MUCH of the health of other British industries, and indeed of the country, depends on an adequate supply of basic chemicals of the right quality, at the right time, and at the right price. The importance, therefore, of a virile chemical industry to the technical and economic development of Britain cannot be overemphasised.

Despite the handicap of shortages of materials and the delays due to their control and to the limitation of capital investment, the British heavy chemical industry is making a tremendous effort to increase productivity, but any possible improvements or changes must be considered.

The report of the Productivity team of 17 members representing the British Heavy Chemical Industry which visited the U.S.A. in March and April, 1952, has now been published by the British Productivity Council (formerly the Anglo-American Council on Productivity: U.K. Section), and is therefore of considerable interest.

While, as is pointed out, a good deal of the information in the report may already be known and acted upon in Britain, this survey amply deserves the thorough study asked for by the members.

Composition of Team

The team under the leadership of J. Grange Moore, M.A. (Imperial Chemical Industries, Ltd.) with D. E. Ladhams, B.Sc., F.R.I.C. (British Industrial Solvents, Ltd.), as secretary, was selected from the supervisory, technical and workshop levels of the British chemical industry. Average age of the team was 41. Seven members were university graduates; those holding supervisory posts had on the average 20 years' works experience, while the three technical specialists had had about 10 years'. The seven workshop members, representing between them three unions, had an average of 23 years' union experience.

Before setting out on its tour, five visits were paid to British heavy chemicals factories. This enabled the members to gain experience in working together as a team and gave them a wider knowledge of the British industry on which to base their comparisons. In the U.S.A., the team visited 15 factories.

The report begins with a summary of opinion, a concise list of the 20 most urgent recommendations and an introduction covering the terms of reference, definitions and economic background. Five other sections follow dealing with: Personnel; buildings, plant and equipment; production; commercial and development policy; productivity.

More Modern Plant in U.S.A.

From information collected the team found that in America today there is a greater percentage of modern chemical plant and equipment than in Britain, with the advantages of design, layout, superior materials handling and automatic control, which modern plants in either country today embody. It was primarily to this that the higher productivity of the American industry could be attributed.

While it was considered that many of the American factories visited were superior to the British in such diverse matters as the selection of recruits, the continuous training of employees at all levels, the delegation of authority, the use of costs, flexibility of apprenticeship schemes, organisation of maintenance work and so on, it was appreciated that a number of the British factories were better in their joint consultation, welfare services, disposal of effluents, utilisation of by-products, guarding of machinery, and the application of work study.

In general the team saw nothing that was new to them on instrumentation, automatic control, materials handling equipment, factory layout, or in the materials of construction of buildings or equipment. Frequently, however, far more extensive use was made of the best of these.

As its fundamental observation the team stated that American companies had, on average, one technically qualified man to every six hourly-paid workers, whereas in Britain this ratio was about one to every 16. It said that it may be more than a coincidence that the ratio of economic productivity of the American chemical industry to the British is also the ratio of

the proportion of technical men to employees in the two industries.

The 20 most urgent recommendations made by the team have been, for the sake of clarity, specifically addressed to the industry, to the unions or to the trade associations, but many of their implications obviously concern all three.

First of these recommendations is that the British heavy chemical manufacturers should immediately arrange, in co-operation with the universities and technical colleges, for the number of technical graduates in their companies to be increased as rapidly as possible, in some factories even doubled, as a primary requirement for the attainment of the highest rate of increase of productivity.

This need is emphasised in the section on 'Personnel' in which it is considered that the higher management in British industry has not in the past seen as clearly as its American counterpart what a sound business proposition it is to hire sufficient technical staff. Another outstanding difference was the generous use in America of technical graduates to overcome plant difficulties.

Again in the recruitment of technical staff it was found that in the U.S.A. closer liaison was maintained between the chemical firms and the universities and technical colleges from which their staffs were recruited. The desire and ability of the American chemical industry, despite other demands, to obtain large numbers of chemical engineers was noted as of great importance. Much more thought will have to be given to this problem in Britain as it is felt that the quantity of graduate technical staff available has done much towards increasing American chemical productivity.

In the section on 'Production' the question is raised whether British chemical companies might not have increased their productivity if, in the past, more technical graduates had been employed specifically for production planning as practised in America.

U.S. Development Policy

Again in the section, on 'Commercial and Development Policy' in a survey of research policy and facilities the team noted that in 1950 nearly 7,500 professional personnel were employed in American organic and inorganic research, representing more than 10 per cent of the total professional personnel employed in all branches of American industrial research. Even so the American chemical industry considered itself very short of technical and research staff. Some firms had even made arrangements to obtain new research workers by offering relatively high salaries to British post-graduate students who were at present at British universities. The team was disturbed at the prospects of this additional drain on the already inadequate supply of technical graduates to the British heavy chemical industry.

It will be noticed that the report deals rather fully with personnel, as it was considered by the team that higher productivity is, in the last analysis produced by the attitude of mind of those who work in the industry.

Urgent Recommendations

Other most urgent recommendations to British heavy chemical manufacturers were:

1. Each company should appoint a committee to determine what more can be done:
   (a) to reduce to the minimum the time interval between the sanctioning of a new project and its coming into full production;
   (b) to ensure that new plant is designed to satisfy the maximum capacity of the market, and that the sizes of individual units and the number of items of standby equipment are chosen to give the maximum annual return per unit of capital employed.
2. Each company should provide schemes for some continuous training of all employees, special attention being paid to the regular training of:
   (a) foremen and junior supervisors in management policies and techniques, in the commercial significance and practical use of costs, and in methods for the regular technical and safety education of their men.
   (b) all production staff in the full and proper use of costs for the continuous improvement of productivity.
3. The status and effectiveness of junior supervisors and foremen should be raised by a closer definition of their jobs and a greater delegation of authority, by stimulation of interest in methods of improvement, by regular meetings with management to discuss policies and costs, and by larger differentials in remuneration.

4. Each factory should assist the technical staff to secure maximum output and technical efficiency from existing chemical plant by transferring the more routine duties to the foreman, by providing non-graduate analysts to help with process studies on shift-work, by the closest co-operation with research staff on plant problems and by the wider use of instrumentation and of automatic control.

5. The advantages of standard rather than historical costing should be considered, with the particular purposes of more closely controlling costs, of more accurately predicting selling prices, and of issuing cost targets in advance to production and maintenance staffs.

6. Widest use should be made by each company of work study, particularly for the improvement of process, maintenance, packing and materials handling methods, for labour and cost control, and for the proper planning and manning of jobs coupled where appropriate with financial incentive schemes.

7. Technical staff should be appointed to study the available types of materials handling and power operated equipment, to survey the whole factory to determine what advantages would result from their use, and to recommend periodically, after careful study, what changes should be made.

8. Full use should be made in each factory of scheduled, planned and preventive maintenance to ensure maximum labour productivity, and a proportion of existing craftsmen should be trained to make the time estimates necessary for proper scheduling and planning, using work measurement as a basis.

9. An attempt should be made to determine the real cost of interrupting production due to making ranges of products, and how these ranges could be simplified by customer education, by the realistic pricing of 'specials' and by further standardisation of quality and packaging.

10. The standard of new entrants to companies should be raised by improving the procedure for selection and initial training of recruits by the use of selection panels and intelligence tests.

11. Each company should consider how its present wages structure could be improved to give greater inducement to work for promotion in job and in status. Differentials, between all levels of promotion, were greater in America than in Britain, and so the incentive to get on was greater in the U.S.A. The team believes that much good could come from a careful examination of wage and salary structure in Britain, where the greater shortage of technical staffs makes it even more desirable than in America to use to the full the intelligence of those on the job.

Recommendations to A.B.C.M.

Recommendations specifically addressed to the Association of British Chemical Manufacturers as of primary importance were:—

1. Highest priority should be given to developing the free interchange of technical information on best British practice within the chemical industry; for example, on the modernisation of factory and plant layout, on the most efficient techniques for the bulk handling of chemicals in all forms, and on the treatment and disposal of effluents.

2. Government departments concerned should be consulted how best to make available to British heavy chemical factories the statistical information which is needed for a proper and continuing assessment of their technical progress in comparison with elsewhere in Britain and also overseas.

3. The association should investigate and advise the heavy chemical industry on the facilities available for obtaining proper training and information on the application of the techniques of work study to chemical processes and to chemical plant maintenance.

4. In consultation with the manufacturers of heavy chemical plant and equipment it should be determined how the need of the heavy chemical industry could most rapidly be met, particularly in the design, standardisation, and speed of delivery of new plant and equipment. British chemical manufacturers are advised to note the American policy of buying mass-produced unit equipment in preference to fabricating their own.

5. Further consultation should be held with the Scientific Instrument Manufacturers' Association of Great Britain, Ltd., the British Industrial Measuring and Control Apparatus Manufacturers' Association, and the Society of Instrument Technology to determine:—

(a) How best to increase the supply of engineers, chemical engineers and

mechanics trained in the selection, use and maintenance of instruments and of automatic control techniques;

(b) How to improve the technical service provided by British instrument manufacturers to the heavy chemical industry, in order to make a fuller and more effective use of instrumentation and of automatic control.

It is also suggested by the team that British chemical firms should consider the possibility of releasing young chemical engineers or chemists with plant experience for further university education in instrumentation and automatic control.

Trade Union Proposals

With regard to the British trade unions the principal recommendations made by the team were:—

1. Modification of the existing apprenticeship schemes to permit

(a) Non-tradesmen to become apprenticed to a trade up to the age of 35 or 40;

(b) existing craftsmen to become apprenticed to a new trade;

(c) a substantial reduction in the present five-year period apprenticeship, subject to the apprentice satisfactorily completing a trade test.

2. Members should be provided with a fuller understanding of the advantages to them of reducing costs, through the use of labour-saving devices as described in recent Productivity Team reports, and by the various techniques of work study, thus raising their standard of living.

3. Effective co-operation between union branches and the local chemical factories in which members work should be increased, with the particular point of obtaining the maximum union co-operation in raising the productivity, and hence the prosperity of the local factory and its employees. This implies the closest working together of all the unions represented in one factory, and a deliberately less rigid view of demarcation agreements and other practices wherever these are clearly reducing productivity.

The report is concluded by a series of appendices which includes industrial production and consumption of U.S. chemicals.

At a Press conference held on 16 January, the leader of the team, Mr. J. G. Moore, said that the British heavy chemical industry was not very much in the public eye and people knew very little about it in spite of the fact that it played a very great part in industry as a whole. He hoped that the Press would give the report some publicity.

When a correspondent asked what the British chemical industry had been doing towards finding more technical graduates, Mr. A. H. N. Wells (a director of A. Boake Roberts & Co., Ltd.) replied on behalf of the team. After outlining past efforts he said that he personally believed that the industry would have to re-open the question and make a greater effort to get more people through the universities and technical colleges. The team, however, did not want to give the impression that the chemical industry was technically weak compared with other British industries. As a matter of fact only the aircraft industry employed a higher proportion of qualified technicians.

Mr. G. F. Clayton (Personnel Manager, Hardman & Holden Ltd.) expressed the opinion that British industry was too particular. The British employer demanded the graduate with an honours degree whereas in the United States they were content with the degree standard.

Referring to the team's recommendation that the ABCM 'should give the highest priority to developing the free interchange of technical information on best British practice within the chemical industry,' a correspondent asked if this meant that firms should exchange details of their own processes, etc. Replying, Mr. Moore said that the team had been very much impressed by the freedom with which information had been given in the U.S.A. not only to members of the team, but to other Americans. The attitude was 'We'll give you this information and you can use it. By the time you are ready to use it a couple of years will have passed and we'll be another two years ahead of you by then.' The team felt that some of this spirit would do the British chemicals industry much good.

Complimentary Copies

Any firm manufacturing heavy chemicals in Britain who has not already received a complimentary copy of the report is entitled to one free copy which can be obtained from The Intelligence Officer, The Association of British Chemicals Manufacturers, 166 Piccadilly, London, W.1. Copies of the report can be purchased from the ABCM on the following cash with order terms: 1-19 copies, 3s. each, post free; 20 copies and over, 2s. 3d. each, post free.

Chemical Research in Australia

Dr. T. F. West in Charge of New Drug Houses Laboratories

IN the past Australia has been a Cinderella among countries so far as privately controlled research work is concerned. This is not belittling the work of Government departments, such as the CSIRO, which has performed invaluable research work. Its scope, however, has naturally been governed by broad national requirements, rather than the unique problems of any particular manufacturer. In the case of overseas companies operating in Australia the bulk of their research is carried out in their parent plants in the United Kingdom or the United States.

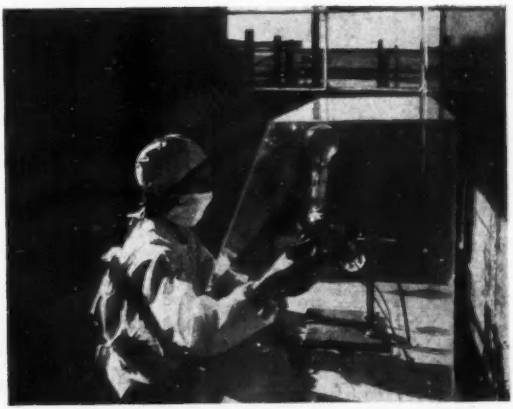
This state of affairs was altered on 20 October, 1952, when Drug Houses of Australia Ltd., opened their new research institute at Balmain, Sydney. By doing so they have made available to Australian and overseas manufacturers a research unit staffed and equipped to work on problems which could not formerly be tackled in that country. As Mr. L. A. Poole (deputy chairman of D.H.A. and managing director of the Sydney associate company, Elliotts & Australian Drug Pty., Ltd.) said at the opening: 'I would like to stress that this research building is, as far as we know, unique in this country as far as private industry is concerned. I say with pride that it is entirely owned within Australia . . . so that this afternoon we break new ground in this country.'

The new centre allows centralisation of the research activities of the D.H.A. Group since development work which was formerly carried on at the individual factories of associate companies is now organised in the one building. The wide variety of interests now embraced by Drug Houses of Australia, Ltd., and the expansion of activities since the second world war created this need for systematic, centralised investigations using the full time services of a staff qualified for the work.

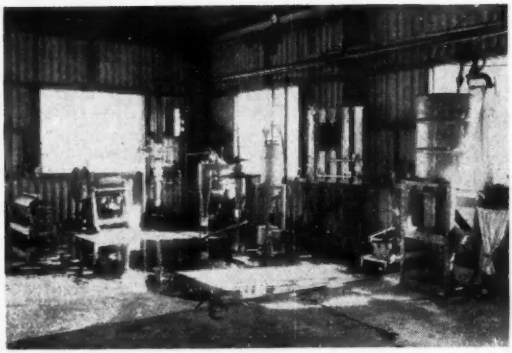
Here, chemical and biological laboratories, sterile laboratories for antibiotic and hormone investigations, pilot plant sections, design and drawing office and storerooms are brought under one roof. The new building comprises three storeys, having a total floor area of 7,520 sq. ft. Individual research laboratories are sited on each floor. The balance of the floor space has not been 'specialised' for particular operations, but, due to the ample provision of services, is readily adaptable for particular pilot plant operations.

A further feature of the building is the incorporation of a well in the upper and second floors which will allow the installation of distillation columns and absorption towers with an overall height of 50 ft. from the ground floor to the under side of the roof.

In these days of extensive and intensive



A view of the sterile laboratories designed for antibiotic and hormone investigations



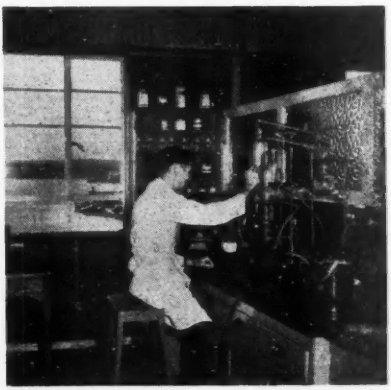
A corner of the pilot plant section on the upper floor

research, scientific investigations demand costly facilities, specialised techniques and strong direction. In the last regard Drug Houses of Australia, Ltd., are fortunate in having their highly qualified research team under the direction of Dr. T. F. West, D.Sc., Ph.D. (London), F.R.I.C., F.R.A.C.I., A.M.I.Chem.E., who is also a director of the parent company. Dr. West was born in Hertfordshire, England, and was educated at the Grammar School at Hertford and later at the Sir John Cass College, University of London. In 1934, he obtained the degree of Bachelor of Science with first class honours in the Special Chemistry Examinations and the degree of Master of Science in organic chemistry. Subsequently, he was awarded the degree of Doctor of Philosophy and elected to Fellowship of the Royal Institute of Chemistry of Great Britain. He received his D.Sc. in 1946.

Dr. West is best known in the chemical world for his researches on the chemistry of the active principles of pyrethrum flowers although he has published some forty research papers on the chemistry of terpenoids and several books on technical subjects. He has also patented many new processes and devices.

He served as vice-chairman of the Association of British Insecticide Manufacturers, and on the consultative committee of the Imperial Institute of Insecticide Materials of Vegetable Origin. He was, for two years, honorary secretary and treasurer of the London Section of the Society of Chemical Industry, and served on the committee of the Canadian Section while working in Canada for two years after the war. Here he filled the post of an assistant director, Ontario Research Foundation. He was also a special lecturer at the University of Toronto. Towards the end of 1948, Dr. West accepted the post of director of the Developmental Division of Drug Houses of Australia, Ltd.

The Minister for National Development, Senator W. H. Spooner said at the opening: 'It is to be hoped that many more Australian firms will follow the lead of Drug Houses of Australia in establishing research facilities. This new building, together with new research facilities being developed particularly by the National University of Canberra, by CSIRO and the Defence Department, could give Australia a much greater chance in the march of progress which depends so much on science, but which can only be turned to best advantage under free political institutions.'



One of the seven chemical laboratories overlooking the Parramatta River

Symposium on Bursting Discs

Design and Application in the Chemical Industry

DEVELOPMENT of bursting disc assemblies and their application in the chemical industry was the subject of a symposium, surveying the problems as they are today, which was held by the Institution of Chemical Engineers at the Caxton Hall, Westminster, London, on Tuesday, 13 January.

The importance of the subject to chemical engineers and the interest taken in it were indicated by the good attendance at the meeting and the fact that 650 pre-prints of the papers were issued.

Mr. Stanley Robson, president of the Institution, in a short introductory speech, said that the idea of the symposium was to encourage an exchange of information not only between those who had valuable practical experience but also with those who wished to know more about bursting discs their advantages and limitations.

'Bursting Disc Assembly for Alternating Pressure and Vacuum at Elevated Temperatures,' was the subject of the first paper delivered by E. A. K. Patrick, B.Sc., A.R.I.C., M.Inst.Gas E. (North Thames Gas Board), who described the development of a bursting disc assembly which had to meet the unusual requirements imposed by a very compact totally-enclosed steam heating system.

The problem was to produce a disc and its holder which would withstand a normal operating pressure of 200 lb./sq. in. at the temperature of steam saturated at this pressure (384°F.) and would burst at a pressure of 300 lb./sq. in. A disc of unusually small size was required which must be renewable by simple means, but could not be readily tampered with.

Method of Replacement

It was decided at an early stage that the bursting disc should be mounted in a plug screwed into the edge of the platen. The virtue of this arrangement was that replacement could be carried out by replacing the entire assembly, the old one containing the broken disc being sent away for recharging. Thus replacements could be made in the field, while recharging the plugs with new discs could be done on the bench.

All unsupervised handling of the bursting disc material could thus be eliminated, and this had a double advantage in the present instance where the material (platinum) was both fragile and of considerable and negotiable value.

Three designs of holder were described. The last (British Patent Specification No. 648,100) had proved satisfactory in use and appeared to have eliminated the difficulties previously experienced.

Nickel Not Practicable

In the selection of bursting disc material nickel was not commercially practicable. Attention was therefore directed toward materials of lower tensile strength, of which aluminium and copper were immediately ruled out on the grounds of work hardening.

First experiments were carried out with silver, but this suffered from a rapid creep which was not tolerable.

The material which was most likely to satisfy the requirements was platinum, it having an ultimate tensile strength not much higher than that of silver, and a very much higher annealing temperature. Although an expensive material, it was found to be a commercial proposition.

After trials in a specially devised testing apparatus, platinum discs were installed in a pair of platens which were to be tried under works conditions. Foil of 0.0033 in. thick, designed to burst at 300 lb./sq. in. was used with satisfactory results.

The work carried out had resulted in the development of a bursting disc holder which gave every indication that it would be satisfactory for the duty required of it.

In the next paper, F. Molyneux, B.Sc. (Engl.), A.M.I.Mech.E., dealt with 'Bursting and Isolating Discs in Chemical Plant.'

Bursting discs as a pressure safety device were now common practice in the chemical industry. Isolating or shear discs, however, although in general use for a long time had only recently been designed for a specific purpose in the chemical industry.

A bursting disc was a weak spot to protect reaction vessels, etc., from the danger of a rapid and excessive rise of pressure.

The chief disadvantage in its use was the difficulty of avoiding the loss of the contents of the vessel when the disc broke.

The bursting and isolating disc gave a full opening for the passage of gas, liquid or viscous materials. It had little inertia, and could be made cheaply from any suitable metal which had adequate resistance to heat and corrosion. It could if desired be made in two parts, providing the necessary corrosion resistance in one and tensile strength in the other.

Of Similar Form

Isolating discs were used in the process industries where metered quantities of fluids or gases were to be fed to a reaction vessel at a definite prearranged time and under prearranged pressure conditions. The discs were generally of the same form as were used in bursting heads; it was, however, necessary to retain the burst disc to avoid fluctuations of flow and to prevent metal fragments entering the reaction vessel.

Use of pure metals in preference to alloys was generally advantageous, since a pure metal was homogeneous and when under pressure a disc suffered a uniform thinning and burst therefore at a definite pressure.

It could also be said that generally the tensile strength of a pure metal was less and the corrosion resistance greater than of its alloys. Thicker discs could therefore be used. An alloy generally had some heterogeneity in its structure, and while these keys increased the tensile strength, they added to stress concentrations under pressure and caused unequal thinning of the disc and unpredictable bursting pressure values.

The following metals and alloys had, however, all been used very successfully:—

Platinum had a high resistance to most corrosive conditions and since it had a low tensile strength (22,000 p.s.i.) relatively thick discs could be used for low pressures.

Gold discs had been used successfully with nitric acid, and due to its extreme ductility it could be obtained in very thin foil for small diameter heads and low pressures.

Silver was a very common disc material since it was relatively cheap, easily worked, reasonably corrosion resistant and could be obtained commercially in a high state of purity.

Copper and aluminium were frequently used since their corrosion resistance was adequate for many processes, and both were readily available as ductile foil of high purity at relatively low cost.

Nickel was used for high temperature, high pressure conditions. It was highly corrosion resistant, particularly to alkalis.

Lead and tin were very suitable for isolating discs because of their low strength and good corrosion resistance. They could not be used at any temperature above approximately 150°C. Lead could be used at very low temperatures, but tin could not because of its allotropic change to grey tin. Both metals suffered from creep when subject to pressure and the discs must be specially prepared and housed.

Tin and lead discs were frequently retained in position by soft soldering.

Successful use of monel metal, stainless steel, and brass, had been reported, but stringent control of the metallurgical conditions was necessary in preparing alloys for use as bursting discs.

Cast iron was used extensively for low pressure work. It had reasonable corrosion resistance and a low tensile strength, and in addition it machined well and fractured along the machined surface. The cast must be carefully controlled to give reproducible and accurate properties.

Use of rubber had not been very successful, because of its variable composition, elasticity, and to the hardening effect of atmospheric oxidation. Synthetic rubbers such as PVC and polythene had been used with greater success. The discs were prepared and stored completely bonded to brass or aluminium housings.

Klingerite Successful

An interesting material recently used as a disc on an explosion vent was a 1/64 in. thick sheet of asbestos jointing material (klingerite). This had been quite successful.

Various types of disc were then described by the speaker.

Most frequently used type was the flat plate disc particularly where the diameter of the aperture and therefore the diameter of the disc was sufficiently great to be able to machine the disc in the requisite form.

The die scored disc was used where it was required to eject a complete pellet. It was frequently scored diagonally, and on bursting opened out like the petals of a flower to give a full opening and at the same time retain the metal. It was always difficult

to ensure completely uniform scoring and inspection was troublesome.

A commercial type was the spheroidal disc which was simply prepared from foil of the requisite thickness. Its disadvantage was that the disc did not completely rupture to give a full opening and it was difficult to ensure retention of all the ruptured material.

Most useful for accurate work was the bowler hat or wide groove spheroidal type of disc. The bowler hat centre was pressed into the plain disc by a correctly shaped punch and at the same time the shear groove was formed by pressure on the die plate. The relatively wide groove could be more easily pressed with accuracy and the thickness in the groove could be easily checked before use.

The bowler hat formed an expansion bulge to take care of expansion and contraction through temperature change and thus to prevent premature rupturing of the disc. Sharp corners or stress raisers were to be avoided in the disc itself.

When fitting the disc it was important that a sharp corner or shear edge should be provided on the down stream side of the burster disc.

Huff recommended a double vee type of housing, the disc edge being held between the sides of the vees and the inner vee providing the shear edge. In the case of lead discs it had been found useful to put a shoulder on the disc and carry the housing over this shoulder. This had been found to reduce the rate of creep.

Fire Extinguisher Type

Shear discs took the form of a flat aluminium or tin plate clamped or soldered in an appropriate housng. A punch was operated to shear the disc on the housing and release a container of either pressurised gas or liquid. This was the type of bursting disc commonly used on fire extinguishers and similar apparatus and could be operated either mechanically or electrically. The shear disc was designed on the flat plate formula to resist the maximum pressure in the vessel and the operating pressure was adjusted to give necessary load to shear this disc.

An ingenious type of magnetic bursting disc had been designed and patented. It was based on rupturing, not the disc, but magnetic lines of force. The housing was a permanent magnet and the disc itself was some ferrous body, frequently cast iron.

A good tool steel was a suitable permanent magnet. Initially this was machined to form a tube of bore equal to the aperture required, with the outside diameter of a calculated size. This housing was then magnetised with a powerful electromagnet and sealed to a boss on the reaction vessel. The cast iron disc was then slid across the open end. With well machined faces this would provide a gas-tight seal.

Extreme Sensitivity

If great accuracy was required the area of the permanent magnet could be reduced to give extreme sensitivity. The disc was non-expendable and could be used repeatedly, but the housing and disc must be of materials capable of being magnetised and therefore sometimes susceptible to corrosion, although portions in contact with the corroding reagent could, if necessary, be sheathed with a thin protective coat of corrosion resisting material, for example, Lithcote, etc.

The disc and housing could be left without attention for some considerable time, but the housing required to be remagnetised at regular intervals.

In the chemical industry bursting discs were very widely employed. Uses ranged from comparatively small diameter discs on the reaction vessels and stills of tar and coke oven plants, and throughout the petroleum industry, to the very large discs or explosion vents used on plant engaged in the production of explosive chemical compounds.

Isolating discs and shear discs were extensively used in the design of chemical propellant plant and in similar plant where gases were required instantaneously at definite pressures as in the case of chemical fire extinguishers.

In conclusion a description was given of various types of discs and housings which were developed during work on the use of chemical fluids for propellant purposes.

The discs were used in conjunction with the use of the following fluids: Aniline, hydrazine, nitric acid, calcium and sodium permanganate solutions, hydrogen peroxide (high strength), methanol, ethanol, aviation spirit, liquid oxygen and liquid anhydrous hydrofluoric acid.

'Bursting Disc Design and Application in the Chemical Industry' was the subject of the final paper of the first session which was delivered by D. J. Breeze, B.Sc. (Monsanto Chemicals, Ltd., Ruabon).

Disadvantages of the ordinary relief valve without some other safeguard had led to the development of thin membranes as protective devices on pressure vessels. These devices, now called bursting or rupture discs, were now widely used in the oil refining and chemical industries, particularly in America.

Guaranteed to Burst

A properly designed bursting disc could be guaranteed to burst at a pressure not exceeding a stated maximum. It had very little inertia, and on failure provided an unobstructed opening for relief of pressure. It could often be used for protecting equipment subject to explosions. Corrosion or excessive temperature invariably weakened a disc; this was no disadvantage from the point of view of safety.

A bursting disc could be installed in such a manner that it was very difficult for an unauthorised person to tamper with it. There were many applications in the chemical industry where a bursting disc, used either alone, in parallel with, or in series with a relief valve could provide greater protection against excessive pressure than a relief valve alone. Nevertheless it must be stressed that bursting discs were seldom used where a relief valve could provide adequate protection, and in many cases provision of a relief valve was statutory.

Two main types of disc were flat or predished. In either case they were best secured between flanges. A description was given of various designs of mounting.

Materials currently used for bursting discs were aluminium, Monel, silver, lead, copper, borosilicate glass, nickel, and the combinations lead/rubber, aluminium/lead, aluminium/asbestos. The asbestos was a proprietary gasket material. The second material in each of the compound rupture discs acted as a protective medium for the first, which formed the actual bursting disc.

Of these materials, lead and glass were not really suitable, and could be used only where there was a wide margin between the design pressure of the vessel and its normal working pressure.

One of the dangers associated with the use of bursting discs was their apparent simplicity. It was difficult to convince an untrained worker that the use of a bursting disc a few thousandths of an inch thicker than specification might wreck a vessel with, say, 2 in. thick walls. Even trained workers had been known to suggest the use of a double thickness of material after a succession of premature disc failures on an item of equipment.

It was essential, therefore, that the distribution of discs remained with a responsible engineer, who must ensure that they were properly applied and that their function was fully understood.

After discussing the design of vessels protected by bursting discs the author went on to give examples of 12 bursting disc applications which had been selected as typical. In conclusion, Mr. Breeze said that it was usually simple to ensure that a bursting disc would never remain whole when subjected to a pressure above a certain maximum, and as a device for protecting vessels against excessive pressure and to some extent, explosions, the bursting disc had proved satisfactory. He had never had any experience of a disc not operating when it should.

Minimising Hazards

It was not always easy, however, to ensure that a bursting disc would operate within a narrow range of pressures, and premature failure of a disc might, in itself, give rise to hazards. These could generally be minimised by:

(a) Good design, that is, provision of an adequate margin between the normal working pressure and the bursting disc pressure, safe venting, best combination of relief valves and discs, and so on.

(b) Good inspection and maintenance, that is, disc testing and scheduled replacement.

The use of bursting discs in the chemical industry would undoubtedly increase now that supplies of discs with a guaranteed bursting range were available. American users had in the past had a great advantage over British users in this respect, and it was encouraging that a start had been made on the centralised manufacture of high grade bursting discs in Britain.

After a brief discussion there was a tea-interval when members and guests took the opportunity of exchanging views of their own

particular problems and experience in relation to bursting discs.

Opening the second session of the symposium, W. R. D. Manning, M.A. (Imperial Chemical Industries, Ltd., Plastics Division). described a tubular type of bursting element for use at very high pressure and explained its advantages. The mathematical basis on which its behaviour could be predicted was stated and some experiences of its use were discussed.

Particular advantages of a tubular bursting element appeared to be: (i) that it could form part of the actual high-pressure pipe system where it was unlikely to block; (ii) that if it did block this would certainly be discovered at once; (iii) that it was simple to prepare and fit; (iv) that it could be relied upon to burst within 2½ per cent of the chosen bursting pressure.

Bursting Disc Assemblies

'Bursting Disc Assemblies—their Design and Manufacture,' were next discussed in a paper by Dr. J. M. Pirie and J. F. W. Brown (Johnson, Matthey & Co., Ltd.). Choice of material was considered and the manufacture and testing of discs was described.

There was at present no British Standard specification, but as a very slight variation in metallurgical condition could have a profound effect on disc behaviour it was most important to adhere closely to a specification agreed between manufacturer and user. The following points should be covered:—

1. The minimum purity of acceptable material.

2. The maximum permissible variations in thickness.

3. The temperature and duration of annealing; the nature of the furnace atmosphere.

4. (*a*) The number of bursting tests to be applied to each batch, and the position at which test discs were to be cut from the strip. (*b*) The size and form of the test orifice and the rate of application of pressure. (*c*) Definition of the agreed bursting pressure-thickness relationship. (*d*) The permissible deviation of bursting pressures from the agreed relationship .

5. The form of the manufacturer's certification.

In the final paper T. B. Philip, A.R.C.S., B.Sc., M.I.Chem.E. (research and development department, Engineering Division, of the Distillers Company, Ltd.) spoke on 'The Use of Ductile Metals for Bursting Discs.' The bibliography on the subject was briefly reviewed and details were given of a method of examining ductile foils. Means for their application in practice were described with particular emphasis on the reliability of such foils as a means of protecting systems operating at elevated pressures provided adequate care was used in their application.

Anti-Foaming Agent

To Combat Effect of Detergents in Effluent

THE presence of synthetic detergents which have found their way into rivers from the sewers, has been known to cause masses of foam extending in some cases 15 or 20 ft. in the air and blowing around the countryside.

Leda Chemicals Limited of Wharf Road, Ponders End, have succeeded in developing a process for the elimination of this foam by using a chemical which they manufacture, for treating effluent before it is finally discharged into the river. This is the subject of a patent recently taken out by the company.

While preliminary tests have been completely successful the process is still undergoing exhaustive testing by the sewage works concerned, particularly with a view to the permanency of the defoaming effect and to any possible toxicity effects.

The process essentially consists in neutralising the synthetic detergents, which are of the anionic type, by using cation active chemicals which the company have recently developed for this purpose.

The process is of particular interest since the same trouble has been prevalent for some time in the U.S.A., and the company's patent has been taken out to cover that country as well as Great Britain, and may result in a considerable earning of dollars.

South African Agents

Henry Balfour & Co., Ltd., have announced the appointment of Messrs. Robertson & Moss Africa, Ltd., as agents for South Africa and the Rhodesias. They will also act as agents for both George Scott & Son (London), Ltd. and Ernest Scott & Co., Ltd., subsidiaries of Henry Balfour & Co., Ltd.

Making Science Work

BIMCAM Holds Annual Luncheon in London

'YOU can be proud of the way in which you have grappled with changing events and the rapidity with which the research instrument is made into a production instrument is a remarkable achievement,' said Sir Charles Ellis, F.R.S., member of the National Coal Board, at the annual luncheon of the British Industrial Measuring and Control Apparatus Manufacturers' Association, held at Brown's Hotel, London, on 13 January.

Basic Principle

To know was to live, said Sir Charles, and the only way to know was to measure. More and more basic industries, including coal-mining, were following the lead of the most modern industries, such as that of atomic energy, in applying this basic principle to all their activities.

Sixty-two members of the BIMCAM and their guests heard Mr. W. G. Ardley, president, propose the toast of 'The Guests,' to which Sir Charles Ellis replied. Mr. L. S. Yoxall, chairman of the Association, expressed disappointment with the terms of the £1,000,000 scheme for Government loans to industry to increase fuel efficiency. It was common knowledge that measuring instruments would give a greater fuel return than almost any other type of equipment. Despite this, measuring and control apparatus had not been included in the Government list of equipment qualifying for the loans. In addition, the amount of the loans envisaged was inadequate.

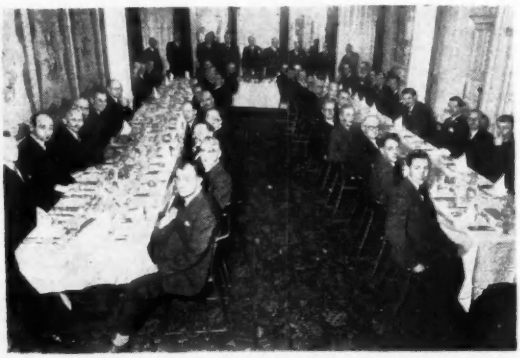
Instructional Literature

Mr. E. B. Moss, president of the Society of Instrument Technology, proposing the toast of BIMCAM, referred to the way in which large sums could be saved by the provision of instructional literature of a high standard. These instructions, supplied by instrument manufacturers, dealt with the installation, maintenance and servicing of their equipment, and great attention was paid to this point in the U.S.A. He even hazarded the opinion that poor instruments could be made acceptable if they were accompanied by good literature, though this was denied by Mr. Yoxall, who stated that good instruments needed no literature at all.

New Members Welcomed

Mr. Ardley welcomed new members of the Association: Messrs. British Pitometer Co., Ltd., Drayton Regulator & Instrument Co., Ltd., and Sunvic Controls, Ltd. The 27 firms now in BIMCAM represent more than 90 per cent of the productive capacity of the industrial instruments industry in Great Britain.

An important activity of BIMCAM this year will be the organising, with related associations, of the 2nd British Instrument Industries Exhibition at Olympia from 30 June to 11 July, 1953.



BIMCAM members and guests at the luncheon

Krilium Now on Sale in Britain

To be Marketed in One Pound Containers

PRODUCTION of British-made Krilium soil conditioner is now in full swing at the Newport, Mon., factory of Monsanto Chemicals, Ltd. In view of the great public interest shown in Krilium since the announcement of its discovery just over a year ago it is to be made available immediately to British home gardeners and small-scale horticulturists. Distribution to wholesale suppliers will begin at once and will be undertaken by Monsanto (Soil Conditioners), Ltd., a newly formed and wholly owned subsidiary of Monsanto Chemicals, Ltd. The product, marketed in a blend specially prepared to facilitate clean handling and easy working, and to be known as the Merloam formulation, will be supplied through normal retail channels in 1 lb. containers selling at 10s. 6d. per lb.

The product to be marketed is based on a vinyl acetate/maleic acid copolymer and is not the polyacrylic acid product featured in announcements at the beginning of 1952. This Merloam formulation is considered to be the most suitable for British conditions at the present time. It is anticipated that within a short time from the commencement of marketing, Krilium will be available from seedsmen, ironmongers, chemists and department stores in most areas, though initially production may not be sufficient to guarantee complete and continuous coverage throughout the entire country. Monsanto (Soil Conditioners), Ltd., which will operate from Abford House, Wilton Road, London, S.W.1, will in no circumstance market Krilium in the Merloam formulation other than through recognised wholesalers.

Krilium is a soil conditioner, which by its specific action on the clay constituents turns difficult problem soils of most types into loose, easily workable loam. Once Krilium has been properly incorporated it is claimed that it will ensure the retention of good soil structure.

It is said that it increases water penetration and availability to roots and makes soil easier to work. It allows air to reach plant roots and prevents soil from packing down under rainfall and watering. It also prevents crusting during dry summer weather. Benefits are said to be faster germination with more seeds coming through, faster growth and bigger root cultivation. Used in poorly aerated soils Krilium (it is said) permits plants and crops to make better use of nutrients added later in the form of standard fertilisers, though it is not a fertiliser in itself.

One pound containers of Krilium in the Merloam formation

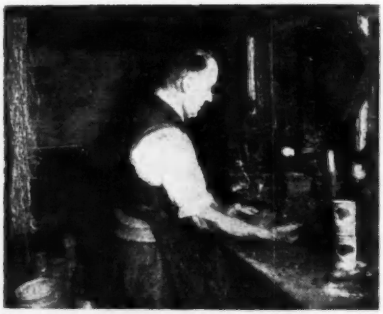
One lb. of Krilium Merloam will condition 16 sq. ft. of soil to a depth of 3 in. or two rows of beans 16 ft. by 6 in., or two rows of radishes, two rows of salad onions and four rows of lettuce, each row 8 ft. by 3 in. This is a total of 64 ft. of 3 in. wide row.

As an alternative to row treatment plants may be treated individually when planting out. By treating the soil in which each plant is to be placed with one level teaspoonful of Krilium Merloam, 1 lb. will be sufficient for approximately 230 plants.

For plant tubs and window boxes 1 lb. of Krilium Merloam will treat the equivalent of 14 buckets of soil. For potted plants one level teaspoon will treat the soil in, for example, one 5 in. pot.

The development of Krilium was announced by Monsanto Chemical Company of St. Louis, U.S.A., at the 29 December, 1951, meeting of the American Association for the Advancement of Science, held in Philadelphia. Intensive testing has been carried out by several hundred independent agricultural and horticultural research

establishments in the U.S.A. and full-scale commercial development has been successfully carried out in that country in the past eight months.



One pound of Krilium is said to be sufficient to treat 230 5" pots

In the early months of 1952 the programme of research on Krilium soil conditioner was extended to Great Britain where, under the auspices of the Agricultural Research Council, the National Agricultural Advisory Council and agricultural research stations, it continues at the present time.

Directors of Monsanto (Soil Conditioners), Ltd., are J. W. Barrett, D. R. Mackie, N. F. Patterson, H. S. Parry and P. A. Singleton. The secretary is Harold Driver. General manager of the company is Gilbert Dodd, previously deputy manager of purchases of Monsanto Chemicals Ltd.

Monsanto (Soil Conditioners), Ltd., will in the first instance undertake the retail marketing of Krilium soil conditioner. The product will be distributed by Monsanto (Soil Conditioners), Ltd., to wholesale and thence to the retail trade.

Mr. Gilbert Dodd joined Monsanto in 1939 as a member of the sales division. In 1949 he was appointed manager of the plastics department and was later appointed deputy manager of the purchasing department. He is well known in the chemical and plastics industries both at home and abroad.

Fertiliser Prospects

Scottish Agricultural Industries, Ltd.

FERTILISER deliveries (other than lime), fell by 112,857 tons in 1952 following the heavy accumulation of stocks by merchants and farmers prior to removal of the price subsidies, according to the statement made by Sir William Gavin, C.B.E., chairman, at the 25th annual general meeting of Scottish Agricultural Industries, Ltd., held in Edinburgh on 15 January.

It was not considered, however, that there had been a serious decline in the quantity of fertilisers actually applied to the land during the year, and the impact of higher prices had been eased by the new subsidies covering both phosphates and nitrogen.

The monetary value of the company's sales during the year under review had again risen, the total of £19,968,938 being some £2,000,000 higher than in 1951 which was itself a record year. Once more, however, the increase was primarily caused by higher prices, particularly of fertilisers following the removal of the old subsidies. It would be seen from the accounts that profits after providing for taxation had fallen substantially from £276,451 to £152,479. Fortunately the £225,000 in recoveries of and overprovision for taxation applicable to previous years, more than offset the fall in profits of £125,000.

Among the directors who had retired during the year were Mr. F. C. O. Speyer and Mr. S. A. H. Whetmore, both of whom had sat on the board as representatives of Imperial Chemical Industries, Ltd., the company's largest shareholder.

Their sound business judgment and their intimate knowledge of the fertiliser trade had been of immense value and it was appropriate to record that the company never failed to receive from I.C.I. the most ready and courteous response to any request for information, advice or practical assistance. They had been succeeded by Mr. S. W. Cheveley and Mr. W. Donald Scott, who carry similar responsibilities as their predecessors did in the agricultural and fertiliser activities of Imperial Chemical Industries, Ltd.

The report and accounts were adopted, and the ordinary dividend of 7½ per cent was confirmed.

Tin in Canned Foods

Reduced Limits Recommended

NEW limits of tin in canned foods have been recommended by the Metallic Contamination Sub-Committee of the Foods Standard Committee in its report which has been approved for publication by Major Gwilym Lloyd-George, the Minister of Food.

It is pointed out by the sub-committee that a limit of 2 grains per lb. (286 parts per million) recommended in a report by the Local Government Board in 1908 had been generally regarded as satisfactory, and that there was practically no evidence of cases of poisoning attributable to excessive tin content in tinned foods.

In view of the improvements in canning methods since that date, and while considering it desirable to maintain a limit, it is proposed that this should be reduced to 250 p.p.m. Until more decisive information is available on the subject of toxicity, it is not thought that any statutory effect need be given to this limit.

With regard to foods and beverages not subjected to a canning process, no recommendation has been made as the data available are not considered complete.

Used to Stabilise Colour

This question, the sub-committee stated, had only assumed practical importance in relation to demerara sugar where it had been customary in the past to add tin chloride during the manufacturing process to stabilise the colour of the sugar. The Royal Commission on Arsenical Poisoning which reported in 1903 expressed the view that tin chloride (a salt which may contain arsenic as an impurity) was an objectionable and unnecessary addition to sugar. The practice had since been largely discontinued and, except in the case of one firm, titanous chloride or alternatively artificial colouring matter was now used in place of tin chloride. No tin chloride was used in British refineries and it was understood that any small traces of tin present in British soft sugars (pieces) and golden syrup were derived from the raw sugar.

Members of the Metallic Contamination Sub-Committee are: G. G. Barnes (chairman), Professor S. J. Cowell, Dr. J. M. Johnston, Dr. W. P. Kennedy, Dr. G. W. Monier-Williams, Dr. J. R. Nicholls, Dr. G. Roche Lynch, G. Taylor and B. W. Smith (secretary).

Any representations which interested parties may wish to make should be addressed to the secretary of the Metallic Contamination Sub-Committee of the Food Standards' Committee at the offices of the Ministry of Food, Food Standards and Labelling Division, Great Westminster House, Horseferry Road, London, S.W.1.

Obituary

Mr. G. G. Vincent

MR. GORDON GILMORE VINCENT, 59, technical services manager of the chemicals department of Canadian Industries, Ltd., and one of Canada's foremost experts on sulphuric acid, died in the Ross Memorial Pavilion of the Royal Victoria Hospital on Christmas Day following a coronary thrombosis.

A native of Woodstock, Ont., Mr. Vincent attended Woodstock Collegiate and then graduated from Queen's University, Kingston, in chemical engineering. In 1918 he joined the Grasselli Chemical Company as a chemist and in 1929, after this company had become part of C-I-L, he became works manager at Coniston, Ont.

A year later he was placed in charge of the new Copper Cliff., Ont., chemicals works and in 1934 he was appointed manager of the Hamilton, Ont., works where he remained six years. During the war he served as security officer for C-I-L and its wartime subsidiary, Defence Industries, Ltd. He rejoined the company's chemicals department at the end of the war.

Mr. Vincent was an ardent hunter and his bird dogs won numerous field trial trophies.

He was a fellow of the Chemical Institute of Canada and a member of the Mining Institute of Canada, the American Waterworks Association, the Canadian Institute of Sewage and Sanitation and the Pulp and Paper Institute.

Jamaican Alumina

Alumina Jamaica Ltd. (formerly Jamaica Bauxites, Ltd.), has now commenced production of alumina. The present output is 120 tons per day, but expansion to 450 tons per day is eventually planned.

Engineering Science

New Subject is a Logical Development

PHARMACEUTICAL engineering science, a new subject in the University of London Honours degree in pharmacy, is a logical development of the wider subject of pharmaceutics, Mr. D. Train, M.C., B.Pharm., told the Pharmaceutical Society in an address given at the Society's House in Bloomsbury Square on 12 January.

Standardisation the Stimulus

A hundred years ago, said Mr. Train, who lectures on pharmaceutical engineering science at the London School of Pharmacy, the retail pharmacist prepared most if not all his own galenicals and, of course, dispensed all his preparations. The publication of the first and second 'British Pharmacopœias' introduced the important factor of standardisation of preparations on a national instead of a regional basis, affording the possibilities of manufacture on a large scale and therefore a more economical proposition. Succeeding pharmacopœias carried the policy of standardisation forward accentuating the tendency of more and more complicated chemical standardisation processes, and making increasing demands for expensive operators which today had reached such proportions that the pharmacists now used such instruments as fluorimeters, spectrophotometers and even the infra-red spectrometer which might cost about £1,700. There was therefore the tendency to leave the retail pharmacist only with his dispensing which 50 years ago demanded a very high order of technical skill.

The education of the man who had now taken over the work of large-scale production of galenicals, formulated preparations, injections, tablets and the like was not, Mr. Train went on, a mere transference of procedure from the dispensing counter to the laboratories of the wholesale manufacturers. It was something quite different because it involved the translation of small scale operations into large-scale operations and for this a different type of person was required. The new man must be a technologist of quite high order in a very specialised field and requiring a new type of training. In addition to the basic training which every pharmacist was given he should know much of the applied physics which provided the scientific background to engineering in general and to chemical engineering in particular. This was not as formidable as it sounded for it merely meant an emphasis on certain aspects of present training. With this knowledge a man could understand the processes taking place at his plant and he would be better able to discuss his problems with the plant engineer and designer.

The syllabus for the course at the School of Pharmacy had been drafted in conjunction with members of the pharmaceutical industry who were also members of the Institution of Chemical Engineers. It was developed in the main on a fundamental approach, but it included sections on safety and materials of construction, the latter to bring out the essential difference between the approach of the engineer and that of the pharmacist, the former asking 'How will the process affect my plant?' the latter 'How will the material affect the medicant and possibly the patient?'

In conclusion Mr. Train said he hoped it would be agreed in due course that the new course was a development of the trends in pharmaceutical practice that had been devised to suit the requirements of the pharmaceutical industry and yet developed so that it would not become outdated by any subsequent changes in process methods which would come along in the near future.

Platinum Metals Survey

The U.S.A., in 1952, was again the largest importer and user of platinum and palladium. Widening acceptance of these metals by industry, particularly in the chemical and electrical fields, was already reflected in the 1951 sales in the U.S.A. of 222,000 oz. of palladium and 209,000 oz. of platinum. In the first six months of 1952 industrial sales were palladium 108,000 oz. and platinum 111,000 oz. These figures were given by C. W. Engelhard, president of Baker & Co., Inc., of Newark, N.J., and its affiliates, including the Baker Platinum, Ltd., reviewing the free world's requirements. The outlook for 1953, Mr. Engelhard declared, was that the overall demand for platinum was likely to continue at a high level, with no indication at present of an oversupply. Palladium supplies should continue adequate. Increasing applications were being found for the four other rare platinum metals—rhodium, ruthenium, iridium and osmium.

Paper from Straw

Agricultural Waste Helps Solve the Paper Shortage

by A. E. WILLIAMS, Ph.D., F.C.S.

WHILE there is always an abundance of cellulose in most areas of the world, the scarcity of a particular form of modified cellulose, or paper, has in recent years been acute. This position has arisen mainly from the continued use of the time-honoured methods of paper making based on wood pulp, a material which is indigenous to such regions as North America, Norway, Sweden, and Finland. It follows that many of the countries outside these areas have either to import wood pulp or to find alternative paper-making materials.

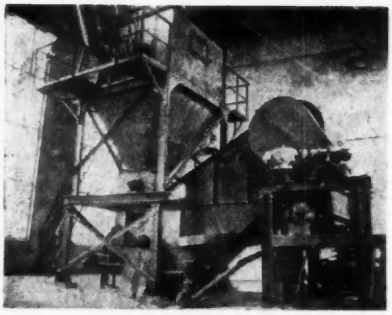
Search For Substitutes

In the search for substitutes much attention has been devoted to the possibilities of straw as a raw material, and an impetus has been given to its use by the greatly increased price of wood pulp. An alternative material to straw is bagasse and this is widely used in the cane sugar growing areas. To a lesser extent, other waste materials available include maize stalks, which are used in the production of board; while linseed waste is applied to the manufacture of cigarette papers. The cereal straws, however, such as rye, wheat, oats, barley and rice, form the chief raw material for the straw pulp industry. In the United Kingdom alone between seven and eight million tons of straw are produced annually, and when all normal agricultural needs have been met, there is still about one million tons available each year for paper making. Up to the present time, however, by no means all of this finds its way to the paper mills, due to lack of the necessary collecting services. Several of the European countries—Holland and Italy, for example—have organised straw collecting on more comprehensive lines and there exists a co-operative scheme between farmers and paper makers. It was during World War II that the United Kingdom made the greatest use of straw for paper making, when about 350,000 tons of straw were pulped each year. The immediate post-war years have seen a fall in this consumption, but plants now coming into production will increase the straw pulp output to surpass that of the war years.

The Celdecor process represents the modern British method of straw-pulping and it incorporates special plant for the cutting and cleaning of the straw (Fig. 1), followed by a mild digestion operation to produce a superior quality pulp (Fig. 2). Abroad the process is being increasingly applied to bagasse and other cellulosic material, including straw. The pioneer of this improved method was Prof. Pomilio, an Italian scientist, who discarded the hitherto almost universally used pressure method for digestion and instituted an atmospheric pressure technique; followed by gas chlorination. While this process was originally developed as the Pomilio process in Italy, it has been modified and greatly improved in Britain. Initially the process was designed so that the products of an electrolytic plant could be used in about the same proportions as produced by the electrolytic cells. Thus the process was attractive to those areas where both salt and electricity were cheap, since the only raw materials needed—apart from the cellulosic material—were common salt in the ratio of about 10 cwt. of salt per ton of bleached pulp product. The caustic soda and chlorine were employed direct from the cells, and this resulted in a high proportion of chlorine being employed in the digestion and bleaching processes; hence the method became known as the chlorine process. This

[Courtesy : Cellulose Development Corporation Ltd.

Fig. 1: Nyblad straw cutter at work. This is the first treatment the baled straw receives on arrival at the pulp mill



Courtesy : Cellulose Development Corporation Ltd.]

Fig. 2: Celdecor patent straw duster, dosing and mixing machine for the addition of caustic soda, and feed to the top of a continuous digestion tower.

employment of a high proportion of chlorine, however, did not give the original Pomilio process any great efficiency, but this deficiency has been remedied during the development of the Celdecor process. In Britain it was discovered that by increasing the amount of caustic soda used in the digestion process better results can be had, and as a consequence the idea of using the electrolytic cell products in the same proportions as the cell produced them was rejected. The electrolytic cells are still employed but their output is not balanced against the pulping mill (Fig. 3) and in many cases both caustic soda and chlorine are available for other processes such as chlorination, the production of hypochlorites, chlorates, etc.

In a typical plant operating the Celdecor process the different operations are as follows. From the straw preparation plant the clean straw is dropped into a mixing and dosing machine, where the cooking chemical solution is added continuously. Based on the dry weight of the fibre, about 11 per cent of caustic soda is taken up by the straw at this stage. A conveyor then carries the treated straw to the top of a cooking tower into which the straw is fed through the medium of a screw conveyor. By means of gravity the straw slowly descends through the tower and during its passage it is heated to around 110°C. to cook it; the period the straw is in the tower being about two hours. On emerging at the base of the tower the straw is in a semi-pulped condition and this is removed continuously to be diluted with either hot water or black liquor from another stage of the process. The diluted semi-pulp is next conveyed to a series of vacuum washers before going into presses for de-watering. De-watered material is conveyed to an opening machine which opens up the pressed semi-pulp so as to present a larger surface area to the chlorine with which it is to be treated. The chlorinating towers have a diameter of about 20 in. and the opened-up straw pulp is discharged directly from the opening machine into the towers and travels slowly about 25 ft. through them. Near the base of the towers are the chlorine gas inlets fixed around the periphery at strategic points. Through these inlets the gas is passed and the gas speed and velocity of the pulp through the tower is so adjusted that the fibre absorbs about 12 per cent of chlorine based on the dry weight of the pulp.

The pulp from the towers proceeds to washing machines which are of the Celdecor-Paxman type rotary vacuum filters (Fig. 4) and it is then treated with a weak caustic soda solution of strength up to about 4 per cent on the weight of the pulp. A caustic extraction stage next follows, wherein the pulp is passed to a reaction chamber for a period sufficient to dissolve the chlorinated compounds. After another washing, the pulp is passed over coarse shaker screens to eliminate any particles of straw which may have escaped the cooking process; the rejected material being processed for the manufacture of board. A series of finer screens is then employed in treating the pulp, from whence it is thickened and mixed with a hypochlorite solution. Excess hypochlorite is removed by further washing and the pulp is then ready for use in paper making.

Cereal Straws Suitable

While all cereal straws are suitable for paper making, some are slightly better than others, but all will make good quality papers. The cellulose content of the various cereal straws varies slightly and average figures are as follows: rye 46.54 per cent, wheat 45.52 per cent, while oats, barley and rice have about 40.48 per cent. Thus from the paper making point of view, rye and wheat straws are preferable to the other three in that they contain a higher proportion of potential pulp. An advantage of rice straw is that it has the highest fibre length to width ratio of all the straws, and this feature imparts to rice straw very good sheet-forming

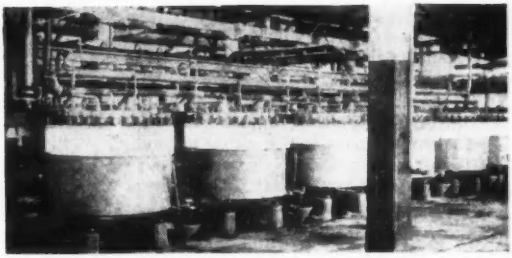


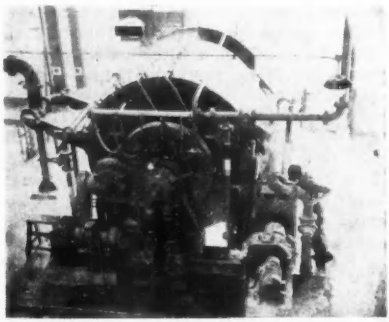
Fig. 3: Diaphragm type electrolytic cells to produce caustic soda and chlorine from salt brine to be used in the pulping process

[*Courtesy: Cellulose Development Corporation Ltd.*

characteristics. The ash content of the different straws varies widely according to the nature of the soil on which they are produced, and this material usually ranges between 3 and 14 per cent of the straw; a large proportion of which is silica. The amount of straw ash which is transferred to the finished paper is governed largely by the process used; some chemical treatments of the pulp remove more ash than others. Moisture content of straw as collected from the farms is generally between 10 and 15 per cent, according to the method of storage, and where the moisture content exceeds 15 per cent it is usual to pay a lower price for the straw. A very high moisture content, such as 25 per cent, entails a preliminary drying of the straw at the pulping mill, particularly when the straw has to be conveyed by air currents in certain stages of the process. Straw that is contaminated with grass, weeds, etc., is generally rejected for paper making purposes, since the cost of removing such contamination would be excessive.

Straw in comparison with wood for paper making has a very mixed constitution, both from the chemical and physical point of view. It follows that in any particular paper making process the reaction of the chemicals with the different constituents of the straw is markedly different. Machines are in existence for eliminating the harder portions of the straw, but as these portions form a high percentage of the total material it is uneconomical to remove all of them. The various parts of the straw may be classed as follows: internodes, leaves, nodes, heads, chaff and dust; the internodes and leaves forming about 77 per cent of the total, although with different straws the make up will vary considerably. For the manufacture of finest papers the straw is invariably pre-cleaned to separate any grain left in the straw, weed seeds, etc.; the grain so collected paying for the cleaning process.

While the Celdecor process has been designed specially for the treatment of straw, there are three other methods by which straw pulp can be made. These are the soda, sulphate, and mono-sulphite processes. The latter method was evolved by Cross and Bevan as long ago as 1880 and has recently been improved in the U.S. Department of Agriculture's Northern Regional Laboratory at Peoria. One of the developments in this process is the application of the Kamyr continuous digestion tower, which appreciably speeds up the conversion of the straw to pulp. The soda and sulphate processes are also well established, having been in use for many years; but while producing a good quality pulp, the yield is relatively low. An advantage of these two processes is that plants can be attached for the recovery of the chemicals used and in many cases this solves the problem of effluent disposal. In contrast to these older methods the modern Celdecor process has been developed specifically to



[*Courtesy: Cellulose Development Corporation Ltd.*

Fig. 4: A Celdecor-Paxman rotary vacuum filter used for washing the bleached pulp

suit straw and similar materials rather than the adoption of an established wood pulp technique modified to suit straw.

In the selection of a process for a particular site the main factors to be considered are chemical supply and effluent disposal. There are instances in which either the soda or sulphate methods have been applied so that the maximum amount of dissolved organic matter in the effluent may be disposed of by incineration, and in practice the greater proportion of such organic matter is eliminated in this manner. On the other hand, with the mono-sulphite process there is usually no attempt made to recover anything. Since this process uses sulphite, the shortage of sulphur which has been a feature in industry for some years, has not encouraged any extension of this process. In some countries producing paper the supply of chemicals is not good and where the necessary chemicals cannot be obtained regularly the soda-chlorine process offers an advantage in that the only essential materials are common salt and electric power for use in the electrolytic cells.

Cooked Under Pressure

Irrespective of any particular pulping technique, until quite recently the tendency was to cook straw under pressure with a strong solution of caustic soda; thereby imitating methods adopted long ago for materials other than straw. Where no agitation was provided in the digester vessel the cooking process was far from uniform, while the effects of channelling were considerable. The effect of the pressure conditions resulted in a low yield of pulp, and the pulp produced had undesirable properties on the paper making machine. In spite of this, the pressure cooking was continued for many years on the assumption that what was so successful with wood should behave likewise with straw. The fact that the open structure of straw enabled the cooking solution to easily penetrate without pressure was overlooked. Pressure vessels were improved to give a uniformly cooked mass when the vessel was provided with agitation, either through a rotating digester or by means of internal mechanical agitation. This improved agitation enabled the strength of the cooking chemicals to be cut down and still produce a good quality pulp. In some European countries this procedure is still being carried out. With improvements in mechanisms for creating efficient agitation of the mass of straw and chemicals it was found possible to manage without a pressure digester, and instead of aiming at converting the batch to pulp in one drastic operation, ideas were concentrated on conditions to suit the straw structure and its different physical make up. It has since been found that operation at atmospheric pressure during the digestion process not only increases the yield of pulp, but also eliminates the undesirable features which were prominent when the pulp reached the paper making machine.

In Britain bleached straw pulp is used largely in printing and book papers to obtain a good printing surface and good 'look-through'. Experience has shown that printers can scarcely detect any difference even with as much as 75 per cent straw pulp as against wood incorporated in the furnish. These papers containing a high proportion of straw pulp are specially suited for the offset process because the straw imparts a firm surface which is non-fluffing. Such firmness of surface is not the ideal for ordinary letterpress and gravure papers, so that it is tempered somewhat by the addition of a soft, soda hardwood, pulp, for example, and loading. Another big outlet for straw pulp is in the production of banks, bonds and writing papers, and in these the straw pulp imparts a surface which is most suitable for writing and typing upon. In the production of both greaseproof papers and glassine use is made of straw pulp, while it is also applied in the manufacture of Massey machine-coated papers. Some countries are now making use of straw pulp in the production of diazo sensitizing papers for engineering prints, in which it is found that by adding from 15 to 25 per cent of straw pulp the attainment of closeness of sheet and hard sizing required for these papers is facilitated. Straw pulp is also employed in the making of sack papers, wrappings, corrugating papers, and box boards; while it has invaded the sphere of newsprint.

Satisfactory Newsprint

Investigations in a British laboratory show that satisfactory newsprint samples can be made by using equal proportions of bleached straw semi-pulp and mechanical pulp. As far back as 1925 an edition of the London *Morning Post* was

printed containing approximately 40 per cent of straw pulp and even at the present time copies of the edition have an excellent appearance.

The fibre dimensions of straw pulps are much smaller than those of the soft woods largely used for wood pulp making, and finer and a little shorter than hardwood fibres; while there is also a higher proportion of cells in straw pulp. This relative shortness of the fibres is used to good advantage in making fine papers from bleached pulp, for it imparts both good appearance and strength to the paper, which may be obtained with wood pulp only by prolonged beating or shortening of the fibres. The amount of beating required for wood pulp is in many cases reduced by admixing straw pulp without reducing the sheet-forming properties. In general, it may be said that straw pulp is less versatile than wood pulp, for the latter is naturally rather soft, but a firm sheet can be produced when required by suitable beating of the pulp.

Difficulty in Softening

On the other hand, straw pulp is naturally firm and cannot easily be rendered soft. Because of this, it is commonly unsuited to the so-called feather-weight printings which are characterised by exceptional bulkiness, or for blotting papers. When compared with writing or printing papers made from well-beaten wood pulp in which the fibre length has been reduced, the strength of straw pulp papers compares very favourably. However, while wood fibres can be made shorter, the straw fibres—which are already short—cannot be made longer and so give to a paper the characteristics associated with long fibres; for example, tearing strength. This is the reason why straw pulp alone is seldom used for making very strong wrapping papers, or paper sacks to contain cement, etc. Although straw pulp is widely used for such purposes, it invariably requires the addition of long fibres to give a high tearing strength. With a very high percentage of straw in a particular furnish, the compactness of sheet formation results in the paper being slightly more difficult to de-water and to dry on the paper making machine. This feature can, however, be allowed for in the design of the machine when it is known that straw is to form a big proportion of the pulp. Rigidity is obviously an important property in making boxes, while it is also necessary for the flutings in corrugated cardboard, which must not collapse under normal pressure. In such applications, straw pulp is often mixed with low grade waste paper pulp.

From the foregoing it is seen that while straw pulp cannot be universally used to replace wood pulp, it has many applications wherein the use of the relatively expensive wood pulp can be reduced.

Royal Institution Lectures

'EXPERIMENTING at High Pressures' will be the subject of the first series of the courses of lectures before Easter to be held at the Royal Institution, 21 Albemarle Street, London, W.1.

The series will be given by Professor D. M. Newitt, M.C., D.Sc., F.R.S. (Courtaulds Professor of Chemical Engineering in the University of London), and will consist of three lectures, as follows:—

(i) Introductory—The Measurement of High Pressure; (ii) The Design of High Pressure Plant and Equipment; (iii) Physical and Chemical Changes Occurring at High Pressure.'

Tuesday next, 27 January, will be the date of the opening talk and the remaining two will be on Tuesdays, 3 and 10 February. All lectures will begin at 5.15 p.m.

Among the series of Friday evening discourses to be given at 9.0 p.m. at the Royal Institution are: 'The Size and Shape of Big Molecules,' by H. W. Melville, D.Sc., F.R.S. (Mason Professor of Chemistry, Birmingham University), on 20 March, and 'Count Rumford and the Royal Institution,' by Sir Eric Rideal, M.B.E., D.Sc., F.R.S., M.R.I., on 27 March.

To Investigate Claims

Next month the Federal Trade Commission will investigate the claims being made by American manufacturers of soil conditioners and chlorophyll and chlorophyll products. All available scientific data will be studied and conferences held during which regulations will be made in an effort to maintain ethical competitive standards to protect both manufacturers and the public. It is reported that misleading or false advertising claims are being made which are not in the public interest.

The Chemist's Bookshelf

PROGRESS IN THE CHEMISTRY OF FATS AND OTHER LIPIDS. Vol. I. Edited by R. T. Holman, W. O. Lunberg and T. Malkin. Pergamon Press, Ltd., London. 1952. Price 42s.

The material contained in this volume was originally intended for a new edition in English of the Hefter-Schoenfeld 'Chemie und Technologie der Fette und Fettprodukte' but owing to the death of the editor, Dr. H. Schoenfeld, the articles have been published instead as the first volume of an annual Progress Series. The subjects dealt with are as follows: The Molecular Structure and Polymerisation of Fatty Acids and their Derivatives, Sterols, Structure and Properties of Phosphatides, Chromatography of Fatty Acids and Related Substances, and Derivatives of the Fatty Acids. In general the articles are very readable and should be of interest to those having only a general knowledge of this field as well as to the specialist.

As this book is the first in this series, it reviews in a fairly general manner the work of many years, and, therefore, provides a useful indication of the present position in this field of research. The lipids are important in many respects. Thus, they are useful raw materials in the manufacture of detergents, surface coatings, antiseptics, etc.; they play an important part in many biological processes and many lipids have interesting physical properties. It is, therefore, very useful to have available a series of publications which summarise the progress made in the study of this important group of substances.—A. S. JONES.

LEHRBUCH DER ORGANISCHEN CHEMIE. I Band. Systematische Organische Chemie. By F. Klages. W. de Gruyter, Berlin. 1952. Pp. xv + 531. DM. 68.

Professor Klages' text-book of organic chemistry will deal with the subject in three volumes as follows: Vol. I, systematic organic chemistry; Vol. II, theoretical and general organic chemistry; and Vol. III, natural products and biochemistry. The book under review is the first half of Vol. I; the second half and Vol. II are stated to be in the press, and Vol. III will appear in 1953.

The text-book is considerably more detailed than the usual texts and, while it reads very easily should form a very useful reference book. It has a refreshing novelty of approach: aliphatic and aromatic compounds are treated together, and the great mass of material is handled deftly and with an appreciation of the possibility of unifying the subject by the use of modern electronic theory. (*See*, for example, Professor Klages' explanation on p. 93 of why amines, unlike alcohols, do not form olefines readily.)

The text is well indexed, and the book is pleasant to handle. A serious detraction is its lack of references to the original literature. Language difficulties and its expense will put it beyond the reach of students; but anyone requiring a readable survey, in some detail, of the whole field of organic chemistry, will look forward to Professor Klages' further volumes with much interest.—J.T.E.

CENTURY OF PLASTICS. Edited by Erwin Barth von Wehrenalp and Dr. Hansjürgen Saechtling. Econ Verlag GmbH, Düsseldorf, Pressehaus. 1952. Pp. 564; 1,000 illustrations. Imitation leather binding. DM. 26; U.S. $8.50.

The extent and importance of the use of plastics in industry and trade as well as in everyday life are so great that it can be known only to the specialist. Up to now a book has been lacking which would acquaint the technician, optician, mechanic, merchant, architect, physician, musical instrument manufacturer, etc., with the multifarious kinds of plastics, their properties and their uses. This book presents in word and picture a vivid perception of the extremely wide range of uses for the various types of plastics. Summaries of the seventeen articles which have been written by German

experts as well as the captions to all photographs are given in English, French and Spanish but the main text is in German.

Both papers and illustrations give information about the use of plastics in the manufacture of chemical apparatus and plant, machine parts, electrical and radio equipment, musical instruments, optical equipment and scientific instruments, furniture, packaging materials, lacquers, adhesives, clothing, jewellery, leather goods, toys, household appliances, etc. The use of plastics in medical science, the transportation industry, the building trade and advertising are also described and illustrated. The photographs are excellent and the 36 coloured plates are exceptionally good.—F.N.

STYRENE. By R. H. Boundy and R. F. Boyer. Reinhold Publishing Corporation. New York. Chapman & Hall, London, 1952. Pp. xxii + 1304. 160s.

More books are published every year upon the various aspects of plastics, or to be more accurate, synthetic high polymers, than upon any other single section of the chemical industry. There are many authors who are willing to introduce us to plastics or show us how they may be used; many again can, by a rapid skimming of the literature, explain the chemistry or technology of plastics in a general way; but there are few indeed who can discuss in detail and with understanding, the chemistry, manufacture, and processing of a single synthetic high polymer. What is needed is a critical, and even at times, a sceptical approach to the vast amount of published material. The author-editors of the present volume pass these criteria without any difficulty, and have produced a work which may be the standard reference book upon the subject of styrene for many years to come. Recently polystyrene has become much more readily available in this country and we may expect a large increase in its applications. From this point of view the publication of the present volume is extremely timely and any manufacturer intending to make use of this comparatively cheap and versatile material, should not fail to consult this monograph.

There is, as the preface admits, a certain amount of repetition, and in some cases there are changes of emphasis in the various chapters; but this is almost inevitable in a work which is a collection of many separate smaller monographs, written by several authors. The book opens with an historical review of the preparation of styrene and its polymerisation, followed by a discussion of present-day methods of manufacture of styrene monomer and a very complete account of its physical properties.

This is succeeded by a well-arranged section which deals with the chemistry of styrene. Although not every reference to the compound is quoted, there is a well authenticated selection which is well arranged and concise.

In the chapter describing the analysis of styrene it is claimed that the most satisfactory method of assay was by the use of mercuric acetate. It would be only fair to point out that this is only so with certain well defined impurities. There are a variety of compounds which will react with mercuric salts under quite a considerable range of conditions, and interference of this sort must be eliminated if consistent results are to be obtained.

There is a brief discussion of the hazards involved in the handling and transport of styrene, and then a very extended account of the polymerisation and uses of the monomer. As much space as has been devoted to all of these subjects is now given to an account of the physical properties of polystyrene. There follows chapters dealing with derivatives or substances allied to styrene. These include the methyl styrenes or vinyltoluenes, ethylvinyl benzene and divinylbenzene and the halogenated styrenes. These compounds, and others like them, are destined to play an increasingly important role in the future and may replace the parent substance for specialised uses. After a description of the uses of styrene in synthetic resins there is a section dealing with the development of polystyrene in Germany. Next comes a survey of the copolymerisation of styrene, and of particular value to the would-be inventor and patent agent, an examination of the patent literature upon the subject of copolymers. The book ends with a very long exposition of the methods of fabrication of polystyrene.

There is a complete author and subject index at the end of the text, and references to each chapter appear at the end of the appropriate section.—J.R.M.

HOME

Workers Redundant

Due to the present order position, the Northern Aluminium Company, of Rogerstone, Monmouthshire, states that 150 workers have been declared to be redundant as from 23 January and a further 100 during the next fortnight. The plant recently began a four-day week pending an improvement in trade.

Return to Private Trade

Government buying of edible tallow, technical tallow and premier jus from overseas is to end and private imports will be resumed shortly. The Ministry of Food has been the sole importer of these commodities since 1939. The arrangements under which private imports may be resumed will be explained to the trade as soon as possible. Prospective importers should not enter into commitments to purchase until a further announcement has been made by the Board of Trade.

A Record Blast

A 1,200 foot long channel, eight feet wide, was recently blasted on Bran Sands, near the River Tees mouth by I.C.I., Ltd., who used some 1,300 lb. of explosive for a job that made possible the flow of effluent from the Wilton factory straight into the river. It is thought to be the longest channel made in Britain by a single blast, a one-minute operation that saved weeks of work on normal excavating methods. The charges were placed two feet below the surface and two yards apart by a specially-designed scoop. Men of the company's Nobel Division were responsible for the work.

Extended Capacity

It is reported that AB. Bofors Nobelkrut of Sweden have greatly extended their production capacity for the manufacture of *iso*-nicotinic acid, which it is hoped will meet the entire Swedish demand and leave considerable quantities available for export.

In addition Bofors are producing the *iso*-nicotinic acid hydrazide in bulk and tablet form, the latter being marketed in Sweden under the brand of 'Raumanon Nobel.' The English agents for Bofors Nobelkrut are Guest Industrials, Ltd., 81 Gracechurch Street, London, E.C.3.

Generating Sets for BEA

An order worth more than £200,000 for five 2,000 kW diesel generating sets each driven by a Mirrlees KVSS 12 engine developing 2,900 b.h.p. and capable of running on low grade fuel, has been received by Mirrlees, Bickerton & Day, Ltd., Stockport, of the Brush Aboe Group, from the British Electricity Authority. The sets are to be installed at the new power station to be built at Ashford, Kent. Two are due for completion by October, 1954, and the remainder by the following autumn.

Plant for Film Base

The installation of a plant for the manufacture of photographic film base has been announced by Ilford, Ltd., in conjunction with B.X. Plastics, Ltd., at Manningtree, near Colchester, at a cost of £1,250,000. Up to the present Britain has been dependent on supplies of film base from America and the new project will save almost $2,000,000 in imports. The new plant will not only make this country self-supporting, but it is hoped that increased supplies of photographic film can be exported.

Wage Increase

The Industrial Disputes Tribunal announced on 19 January that it has awarded a wage increase to about 120,000 workers in the heavy chemical and allied industries. The award gives an extra penny an hour to men and three farthings an hour to women with proportionate increases for juveniles. This will operate from the first full pay period following 13 January.

Plasticiser Price Lowered

British Industrial Solvents, Ltd., have reduced by 2½d. per lb. the price of 'Bisoflex 791' (a dioctyl phthalate type plasticiser). The new prices (all per lb. carriage paid) became effective on 19 January and are as follows:—

10 tons, spot or contract	(a)	2s. 3d.
5 tons, spot or contract	(a)	2s. 3½d.
1 ton, spot or contract	(a)	2s. 3¾d.
45 gallon drum	(a)	2s. 4½d.
10 gallons	(b)	2s. 7d.
5 gallons	(b)	2s. 8d.

(a) packages charged, and credited on return at seller's expense.
(b) packages included.

OVERSEAS

Synthetic Rubber Output

The Reconstruction Finance Corporation of America hopes to produce 172,250 long tons of general-purpose synthetic rubber during the first quarter of 1953. Output is expected to total 54,000 long tons in January, 55,250 in February, and 63,000 in March.

Edmonton's Chemical Prospects

Edmonton may emerge as the largest chemical centre in Canada, according to Dr. J. R. Donald, of Montreal, head of J. T. Donald & Co. Ltd., chemical engineers and consulting chemists. Initial leadership in the chemical field would go either to Edmonton or Sarnia, Ont., declared Dr. Donald, and it seemed probable that eventually Edmonton would exceed Sarnia. Natural resources, including gas and oil, gave grounds for future confidence in the development of chemical industries at Edmonton.

World Aluminium Production

World output of aluminium in 1952 was nearly equal to the peak level reached in 1943 of 1,870,000 metric tons, according to a survey issued by the Norwegian Aluminium Company. Expansion plans approved in 1951-52 will further increase production by nearly another 1,000,000 tons during the next three years. Major projects are in Canada and the U.S.A., but in Europe there are plans for raising output by 150,000 tons. The new aluminium plant at Sunndalsöra, West Norway, will produce 40,000 tons a year and is scheduled for completion in 1954-55.

Alfa-grass Pulp Project

A factory, estimated to cost about £1,000,000, is to be built in Tunisia for the production of pulp and paper from alfa-grass. An agreement has been signed by a British group with the Tunisian Government, and French and Tunisian capital will participate. Construction of the plant, which will have an annual capacity of 60,000 tons of pulp and paper, is expected to begin shortly so that it may be completed in time to process the 1954 harvest of alfa-grass. The site will be in the neighbourhood of Oved Ellil (Kroumiric district) where water and hydro-electric power are available.

Base-metal Discovery

Investigations are being carried out on newly discovered base-metal deposits in the Bathurst area, New Brunswick, in order to discover their commercial value and the amount of capital that will be required to develop them. After studying the cores from several drill holes it has been estimated that there are 28,813 tons of lead and zinc ore per vertical foot in the one holding. Average grade at the 200-foot horizon is estimated at 5.2 per cent zinc, 1.61 per cent lead, and 0.05 per cent copper. Silver is said to average 1.98 ounces per ton. New York financial interests are believed to be behind the undertaking.

Italian Metal Prospects

Progress of the modernisation and reorganisation of Italy's metal industries is reflected in the increased output during the first nine months of 1952 which brings her into sixth place among the iron and steel producers of Western Europe. Further improvement is expected as a result of the new plant at Cornigliano which is due to be inaugurated this year. Output of cast iron up to the end of September, 1952 was 844,000 metric tons and it is expected that the total will be over 1,000,000 tons by the end of December. Iron alloys, especially ferro-manganese and ferro-silicon, also showed a marked rise in output during the same period. Steel production for the first nine months of 1952 amounted to 2,626,500 metric tons, and aluminium output rose by 1,700 tons to 395,000 tons.

Industrial Management Study

Plans for an expanded Executive Development Programme in 1953/54 for the Sloan Fellowships in industrial management at the Massachusetts Institute of Technology were announced by Dean E. P. Brooks on 5 January. Two groups of 15 to 18 Sloan fellowship recipients will be catered for. Candidates must be between 30 and 35 years of age having at least five to 10 years' industrial experience, of which part must have been in a managerial capacity. Competition for fellowships to the programme will close on 21 February. Fellows will be in residence at the Institute in Cambridge, Mass., from June 1953 to June 1954.

PERSONAL

MR. GEORGE H. SEARLE, since 1922 chief chemist of T. Wall & Sons, Ltd., ice-cream and meat-products manufacturers, of London, Manchester and Edinburgh, has retired. Mr. Searle in 1922 formulated the recipe for the first Wall's ice-cream mix. He also formulated the first recipe for Snofrutes—the water ices that were so popular before the war and which, it is hoped, will shortly be re-introduced by Wall's. Mr. Searle, who went to Wall's from Brand & Co., Ltd., meat-products and sauce manufacturers, of Vauxhall, was responsible for establishing Wall's laboratories. In 1922 he was single-handed in his task; on his retirement he had a staff of nearly 30 in laboratories at the firm's three factories in Acton, Godley (near Manchester) and Craigmillar (near Edinburgh).

Mr. Searle

MR. E. G. FISHER, M.P.S., one of Britain's leading experts in thermoplastics, who has written and lectured extensively on the subject in this country and abroad, has been appointed technical consultant in thermoplastics to the Toa Gosei Chemical Industry Co., Ltd. Mr. Fisher—the first British consultant in the plastics industry to obtain such an appointment with a Japanese firm—visited Toa Gosei in 1951, when on a world tour for R. H. Windsor, Ltd., the manufacturers of plastics machinery, of Chessington, Surrey. While with the Japanese firm he supervised the extrusion of the first length of unplasticised P.V.C. in Japan.

MR. J. HOWARD REDFERN, M.A., has been appointed sales manager of Theodore St. Just & Co., Ltd., as from 1 January of this year.

MR. W. W. FOSTER, general works manager at Fort Dunlop, is retiring at the end of the month because of ill-health, but he will remain available for consultation. He is succeeded by MR. E. E. QUINTON, general works manager at Dunlop's Speke factory, whose successor is MR. A. T. ROBERSON, Dunlop works director in South Africa.

Mr. Foster, who is 62, was educated at Queen Mary's Grammar School, Walsall. After engineering experience with Messrs. Bellis & Moncour, Ltd., Birmingham, and in the Royal Flying Corps, he went to Fort Dunlop in 1920. He was works director of the Durban factory from 1934 to 1938 when he was appointed works superintendent at Fort Dunlop. He joined the local board in 1944 and became general works manager next year.

Mr. Quinton was born in Birmingham 52 years ago and took his B.Sc. in chemistry at Birmingham University. After an apprenticeship at the Metropolitan-Vickers works in Manchester he went to Fort Dunlop in 1924 but left for South Africa in 1934 to take up the post of technical manager at Dunlop's Durban factory. He was appointed works manager there in 1937, and works director from 1942 until he returned to England to succeed MR. D. B. COLLETT as general works manager at Speke.

After 37 years' service as an industrial salesman with Vacuum Oil Company, MR. R. J. MCMILLAN has retired. His early years were spent in the West Country, but when he returned from the 1914-1918 War, Mr. McMillan took up his appointment covering the West End and City of London.

Metropolitan-Vickers Electrical Co., Ltd., announces that PROFESSOR WILLIS JACKSON, D.Sc., D.Phil., M.I.E.E., has accepted the full time appointment of director of research and education of that company as from 1 July next. The appointment carries with it a seat on the board of the company. Professor Jackson is Professor of Electrical Engineering at The Imperial College of Science & Technology of the University of London.

The present director of research and education, who succeeded Sir Arthur P. M. Fleming in that position, is DR. C. DANNATT. Professor Jackson's appointment will release Dr. Dannatt for an extension of his present duties as assistant managing director.

Publications & Announcements

FIRST distillation of eucalyptus leaves was made near Dandenong, Victoria, Australia, in 1852, by Joseph Bosisto. Oil of Euc. Australiana was composed of many chemical ingredients, the chief of which were phellandrene and eucaltyptol. The therapeutic value of the latter was appreciated and developed by J. Bosisto & Co., Pty., Ltd., a division of Drug Houses of Australia, Ltd. To mark the centenary of the firm, a booklet has been published telling of the growth of the company and the story of the Eucalypts. Entitled 'A Century of Gum Leaves,' the booklet is published by the Ramsay, Ware Publishing Pty., Ltd., of Melbourne.

* * *

UP-TO-DATE information on the safe handling and storage of cresols, or cresylic acids, is contained in 'Manual Sheet SD-48,' latest in the series of chemical safety data sheets issued by the Manufacturing Chemists' Association, Inc. As encountered in industry, cresols are a hazard principally to the eyes and skin, although they are also toxic and constitute a moderate fire menace. Despite this, however, they can be and are handled in large quantities with safety. The 16-page data sheet describes precautions to be observed in unloading, emptying, handling, storage and disposal of the materials. It also describes health hazards and their control. Copies of the sheet are available at 25 cents each from the Manufacturing Chemists' Association, Inc., 246 Woodward Building, Washington 5, D.C.

* * *

'PAINTING Practice for Aluminium' is the title of a new information bulletin (No. 20, price 2s.), just issued by the Aluminium Development Association, London. Surface finishing (including painting) was discussed in Bulletin No. 13, 'Surface Finishing of Aluminium and its Alloys.' Since then, however, such advances have been made as to justify a separate bulletin on painting practice. The publication opens with a broad survey of the modifications necessary when dealing with aluminium. Subsequent sections deal with cleaning and degreasing, pre-treatment where necessary, choice of paint system (single or multi-coats), and the repainting of small and large components and structures.

MORE than 4,000 references to the international literature of insecticides are contained in 'Literatur zur HcH und Dien Gruppe' (Verlag Paul Parey, Berlin, 1952. Pp. 128, DM. 25), collated by Dr. R. Reimschneider, known to readers of THE CHEMICAL AGE for his special research work in this field. Each insecticide is listed according to its chemical, physical, or biological properties. A supplement on 'Contact Insecticides on Halogenated Hydrocarbon Base' (Pp. 32, DM. 5) presents a critical examination of the literature besides the author's own researches and offers a completion of the chemical structure of the newer insecticides of the Dien-and Terpen-group (chlordan, M410, heptachlor, aldrin, dieldrin, toxaphen, trichlorocamphene, and others).

* * *

CHEMICAL compositions of stainless and other than stainless steels, creep resisting steels, and information about the Austenitic stainless steels widely used in chemical plant and in the tanning, dyeing, rubber, and oil industries are among the data given in a booklet for designers and users of tubes and tubular parts issued by Accles & Pollock, Ltd., Oldbury, Birmingham. The booklet, which covers the whole range of the company's products, supplies a useful reference work. It is in the form of a strong loose-leaf folder so that extra sheets or amendments may be easily added.

* * *

WIRE from the rod to a wide variety of finished wire goods, wire machinery and processes and wire drawing research are all adequately dealt with in the second edition of 'The Wire Reference Year Book and Directory' (incorporating the 'Rod and Strip Annual,' and 'Heat Treatment Review') 1952/53, published by Alfred Hinde, Ltd., Wolverhampton (25s.). The new geographical method of coding adopted not only achieved readable compactness, but enabled the price to be reduced by 5s. The volume contains what is believed to be the only current bibliography on Wire, covering world-wide articles which have appeared since 1940. A considerable supplement of American bibliography has been added.

PROVISIONS of the Pharmacy and Poisons Act, 1933, and Poisons Rules 1952, relating to the sales of insecticides, fungicides, weedkillers and rodenticides, brought up to date to include the revised regulations covering the sales of the organo phosphorus insecticides and dipitro-cresol weedkillers, are indicated in a chart prepared by the Association of British Insecticide Manufacturers. The chart gives the names or schedules in the poisons list, restrictions schedules, labelling particulars and conditions applicable to (a) retail sales; (b) wholesale sales; and (c) sales to growers. Copies of the chart (price 6d. net, cash with order), may be obtained from the offices of the association, 166 Piccadilly, London, W.1.

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A COMPREHENSIVE survey of where to obtain supplies of British chemicals and allied products is again given in the 1953 edition of 'British Chemicals and their Manufacturers' just published by the Association of British Chemical Manufacturers. The directory is published every other year (the last edition being in 1951), and it is proposed that the next issue will be in 1955. The present volume is larger and retains all the features which have, in the light of experience, proved valuable to inquirers. It will be noticed that there are several gaps in the numbers in the code references. These have been left to provide for new members and to avoid, as far as possible, upsetting the whole series of numbers in the next edition when firms join the association. Copies of the directory are available, free of charge, to persons or firms genuinely interested in the purchase of chemicals. All inquiries should be addressed to the Association of British Chemical Manufacturers, 166 Piccadilly, London, W.1.

* * *

DYESTUFFS are probably used today in a wider and more diverse range of industries than any other manufactured product. From the time of its inception in 1877 the firm of Williams (Hounslow), Ltd., has been connected with the development of the science of colour chemistry, and four generations of the original family have now entered the business. To mark its uninterrupted expansion, a handsome illustrated book ,'Seventy-Five Years of Progress, 1877-1952,' has been published by the company. The story is traced from the discoveries (before the formation of the company) by Greville Williams of Cyanine or Quinoline Blue in 1857 and Safranine in 1859, two of the most important basic colours, up to the modern production of Spirit Nigrosine, employed mainly in moulding powders for the plastics industry and the recent development of dyestuffs suitable for colouring polystyrene and cellulose acetate.

* * *

PENETRATING electrodes specially recommended for the welding of close butt joints in mild steel plate up to $\frac{5}{8}$ in. thick, or for flat fillet welds are described in a new technical circular (No. 878), issued by the Quasi-Arc Company Ltd., Bilston, Staffordshire. These Weldeep electrodes are claimed to be considerably faster than general purpose mild steel electrodes, enabling many welded joints to be completed at 30 to 70 per cent of the normal cost. Full instructions are given of the special techniques required and the company will be pleased to arrange demonstrations.

* * *

SERIOUS accidents occur every year because welding, brazing, soldering or cutting operations involving the application of heat are attempted on fuel tanks, drums and similar vessels which are known to have contained inflammable liquids or other combustible material but have not been made safe for the work. General guidance on the precautions which experience has shown to be most satisfactory is given in 'Repair of Drums and Tanks' (HMSO 1s. 6d.), prepared by the Factory Department of the Ministry of Labour and National Service. This is No. 18 in a series of Safety Pamphlets. The memorandum is primarily concerned with drums or tanks which are not entered by workmen for cleaning from inside; it is pointed out that the precautions must vary with the type of container, its internal condition and the nature of the material it has held. Reference is made to Factory Form No. 814 'Memorandum on Explosion and Gassing Risks in Cleaning, Examination and Repairs of Stills, Tanks, etc.' (HMSO 4d.), which deals with precautions to be adopted in work on larger containers. The pamphlet also gives legal requirements regarding safety precautions, contains a number of illustrations and has a number of appendices giving details of some of the accidents which have occurred.

Next Week's Events

MONDAY 26 JANUARY

Society of Chemical Industry

Newport: The Technical College, 7 p.m. Meeting of the South Wales Section.

North East Metallurgical Society

Middlesbrough: Cleveland Scientific and Technical Institution, 7.15 p.m. Discussion on: 'The Training of a Metallurgist.' Opening speaker: A. D. Merriman.

Institution of the Rubber Industry

Manchester: Engineers' Club, Albert Square, 6.15 p.m. V. E. Gough and Miss D. Wyatt (Dunlop Research Centre): 'The Study of Ozone Cracking by Cinematography.'

TUESDAY 27 JANUARY

The Chemical Society

Manchester: The University, 6.30 p.m. Reading of original papers.

Hull Chemical & Engineering Society

Hull: Church Institute, Albion Street, 7.30 p.m. N. H. Collings: 'Silicones and their Industrial Uses.'

Society of Instrument Technology

London: Manson House, Portland Place, W.1, 6.30 p.m. F. W. Hayward: 'Instrumentation in the Paper Making Industry.'

WEDNESDAY 28 JANUARY

Society of Chemical Industry

Dublin: Trinity College, 7.45 p.m. W. P. Doyle: 'Luminescence in Solid Materials.'

London: Burlington House, Piccadilly, W.1, 6.15 p.m. Nutrition Panel of the Food Group. 'Food and the Future—No. 2., Present Methods of Attack on the Problem.' Speakers: Dr. G. A. C. Herklots and Professor J. Yudkin.

Manchester Literary & Philosophical Society

Manchester: Portico Library, Mosley Street, 5.45 p.m. Chemical Section. Charles F. Young (Hardman & Holden, Ltd.): 'Sulphur.'

Society of Public Analysts

Glasgow: 123 Sauchiehall Street, 12.30 p.m. Scottish Section, 18th annual general meeting. Election of officers.

THURSDAY 29 JANUARY

The Chemical Society

Aberystwyth: Edward Davies Chemical Laboratories, 5.30 p.m. Joint meeting with the University College of Wales Chemical Society. Professor C. W. Shoppee: 'Reaction Mechanism and Molecular Geometry.'

Gloucester: The Technical College, 7.15 p.m. Joint meeting with the RIC and Bristol Section of the SCI. Professor L. Hunter: 'Progress in Hydrogen-bond Chemistry.'

Hull: University College, 6 p.m. Lecture by Dr. A. F. Wells.

Nottingham: The University, 4.45 p.m. Professor F. S. Dainton: 'Experiments with Radioactive and Stable Isotopes.'

Institute of Metals

Birmingham: James Watt Memorial Institute, Great Charles Street, 6.30 p.m. Discussion on 'Modern Technique in Spectrographic Analysis.'

Society of Public Analysts

London: Sir John Cass College, Jewry Street, Aldgate, E.C.3, 7 p.m. Microchemistry Group. Ninth annual general meeting, preceded by afternoon visit to new factory of L. Oertling, Ltd., St. Mary Cray, Orpington, Kent.

Incorporated Plant Engineers

Sheffield: Grand Hotel, 7.30 p.m. 'Oxygen in Industry': film and demonstration of liquid oxygen by the British Oxygen Company. Discussion, opened by H. Townend.

FRIDAY 30 JANUARY

The Chemical Society

Plymouth: The Technical College, 7.30 p.m. Joint meeting with the RIC and South Western Section of the SCI. Professor H. T. S. Britton: 'Seeing, Electrometrically, How Chemical Reactions Take Place.'

St. Andrews: United College, 5.15 p.m. Professor R. G. W. Norrish: 'The Study of Combustion by the Method of Flash Photolysis.'

Plastics Institute

Manchester: Grand Hotel. Annual dinner-dance.

Society of Public Analysts

Birmingham: The University, Edmund Street, 6.30 p.m. 'Chromatography.' Papers will be presented by Dr. Trevor I. Williams, D. B. Rees and R. A. Wells, and Dr. J. K. N. Jones. Organised by the Physical Methods Group.

(continued on next page

SATURDAY 31 JANUARY

Institution of Chemical Engineers

Birmingham: The University, Edmund Street. Annual general meeting of the Midlands Branch. W. A. Damon: 'The Treatment of Waste Gases in Chemical Industry.'

Society of Leather Trades' Chemists

Manchester: Engineers' Club, Albert Square, 2 p.m. Dr. W. S. Short: 'Syntans'; R. Denyer: 'Application of Syntans'; G. J. Cutbush: 'Developments in the Methods of Moisture Determination.'

Market Reports

LONDON.—Conditions in the industrial chemicals market show little change on the week and inquiries for new business have been satisfactory in comparison with the rather slow market which has prevailed immediately before and after the holiday season. In addition to the price changes given in the report last week, the quotations for Rochelle salt are now reduced by 20s. per cwt., oxalic acid is cheaper at £138 per ton and further reductions in zinc oxide prices are reported. The price for red seal is now £120 10s. per ton, green seal £122 10s. and white seal £123 10s. As from 19 January 'BISOL' acetone as also been reduced, the new price being £102 per ton for 50 tons. A further reduction has been made in the price of lead and basis prices as from 14 January are for dry red lead and litharge £128 5s. per ton and for dry white lead £144 per ton. Most items in the coal-tar products are now in good supply and there is a steady demand for pitch and creosote both for home and overseas market.

MANCHESTER.—Trading conditions on the Manchester market for heavy chemical products during the past week have shown a further gradual improvement after the recent dullness, though there is still room for recovery before business can be regarded as satisfactory. Home and export inquiry for the alkali products and for some of the potash, ammonia and magnesia compounds has been on a fair scale and reasonably good deliveries are being taken of goods already on order. Values are mostly on a steady basis.

Shell Price Reductions

SHELL CHEMICALS, LTD., have announced a reduction in price of a number of their products as from 19 January. The products affected are 'Shell' acetone, 'Alphanol' 79 and nonanol.

The new prices for acetone are as follows:

In small lots:	*Per ton.*
5 gallon drums	£143
10 gallon drums	£133
In 40/45 gallon drums:	
Less than 1 ton	£108
1-10 tons	£105
10-50 tons	£103
50 tons and over	£102

Five gallon and 10 gallon drum lots will be supplied in free and non-returnable containers; 40/45 gallon drums remain on a returnable basis.

The reduction in the case of 'Alphanol' 79 and nonanol will be £20 per ton, and the following price scale now operates:—

	"Alphanol" 79 Per ton	Nonanol Per ton
	£ s. d.	£ s. d.
In small lots :		
5-gallon drums ..	220 0 0	220 0 0
10-gallon drums ..	206 0 0	206 0 0
In 40/45 gallon drums :		
Less than 1 ton ..	192 0 0	192 0 0
1- 50 tons	185 0 0	185 0 0
50-100 tons	182 10 0	182 10 0
100-250 tons	180 0 0	180 0 0
250-500 tons	177 10 0	177 10 0
500 tons and over ..	175 0 0	175 0 0

Microchemistry AGM

The annual general meeting of the Microchemistry Group of the Society of Public Analysis will be held at Sir John Cass College, London, E.C.3, on 29 January, at 7 p.m. The retiring chairman, Dr. Cecil L. Wilson, will give an address entitled 'Microchemistry: An Appraisal.'

UKARB Carbon Blacks

Prices of UKARB grades of carbon black, manufactured by Messrs. United Carbon Black, Ltd., have been reduced as from 1 January and are now as follows:—

UKARB 327, 8d. per lb. ex works Swansea in minimum 5 tons; 9d. per lb. ex store London and Manchester in smaller quantities.

UKARB 340, 9⅜d. per lb. ex works Swansea in minimum 5 tons; 10⅜d. per lb. ex store London or Manchester for smaller quantities.

Law & Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary but such total may have been reduced.)

MIDLAND PETROLEUM CO., LTD., Leamington Spa. (M., 24/1/53.) 18 December, £10,000 (not ex.) debentures, to Shell-Mex and B.P. Ltd.; general charge.

UNITED PHOSPHATE & MALT CO., LTD., London, N.W. (M., 24/1/53.) 15 December, £25,000 mortgage, to Cornhill Insurance Co., Ltd.; charged on 41/43 Standard Road, Chase Estate, Acton. *Nil. 21 March, 1952.

Satisfaction

BORAX CONSOLIDATED, LTD., London, E.C. (M.S., 24/1/53.) Satisfactions, 22 December, of Trust Deeds registered 24 July, 1902, and 29 October, 1912, and supplemental deeds registered 12 October, 1923, and 17 May, 1930.

Receivership

F. Cansdale, of 6 Eldon Street, E.C.2, ceased to act as Receiver of METAL CHEMICAL FINISHERS (LIPHOOK), LTD., on 10 December, 1952.

New Registrations

C.T. Laboratories Ltd.

Private company. (515,093). Capital £100. Manufacturers of chemical preparations; analytical and research chemists, etc. Directors: F. V. Well, R. S. Musel and E. I. Lubowe. Reg. office: Turestin, The Street, West Horsley, Surrey.

Danver Trading Co. Ltd.

Private company. (514,759). Capital: £100. Exporters or importers of steel, chemicals, cement, plastic goods, etc. Directors: J. J. Jordan and J. J. Driscoll, 114 Norfolk Road, Seven Kings, Essex.

G.N.R.D. Patent Holdings, Ltd.

Private company. (514,820). Capital £400. To acquire any letters patent relating to inventions in respect of methods or machines for the synthesis of therapeutic substances and of any equipment in connection therewith, etc. So long as the National Research Development Corporation hold any share the company shall not exercise any activity which is not within the statutory functions of the said corporation. First directors to be appointed by subscribers. Solicitors: H. K. Turner, 1 Tilney Street, W.1.

Monsanto (Soil Conditioners) Ltd.

Private company. (514,926). Capital £100. Producers, manufacturers of and dealers in fertilisers, manures, soil conditioners and soil cleansers. Subscribers: A. Mallinson and S. Disborough. First directors are not named. Solicitors: Slaughter & May, 18 Austin Friars, E.C.2.

National Benzole Holdings Ltd.

Private company. (514,789). Capital £100. To acquire not less than 90 per cent of the issue share capital of National Benzole Company Ltd. Directors: A. B. Hittinger, G. A. Hebden, H. H. Bates. Reg. office: Wellington House, Buckingham Gate, S.W.1.

Pacific Chemicals Ltd.

Private company. (515,048). Capital £5,000. Importers, exporters and vendors of pharmaceutical and chemical preparations, drugs, etc. Directors: C. C. Young, M. M. Young. Reg. office: 17 Cannon Street, E.C.4.

'BISOL' Acetone Reduced

British Industrial Solvents, Ltd., have announced a reduction in the price of 'BISOL' acetone, effective on and after 19 January. The new price schedule (in £ per ton, carriage paid) is as follows:

50 tons, spot on contract	(a)	£102
10 " " " "	(a)	£103
1 ton " " "	(a)	£105
40/45 gallon drum	(a)	£108
10 gallons	(b)	£133
5 gallons	(b)	£143

(a) packages returnable at seller's expense.
(b) packages included.

Allowances for bulk delivery remain unchanged.

Cheaper Phthalate

A. Boake, Roberts & Co., Ltd., with effect from 19 January, reduced the price of their Phthalate 79 by 2½d. per lb. The new rates are as follows:—

	Price per lb.
10 tons spot or against 6 monthly contract	2/3d
5 " " "	2/3¼
1 ton " " "	2/3½
40 gallon drum lots	2/4½

Minimum 5-ton deliveries taken in drums are subject to an allowance of £1 per ton and minimum 1-ton deliveries taken in tank wagon to one of £2 per ton.

CLASSIFIED ADVERTISEMENTS

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 *inclusive, or a woman aged* 18-59 *inclusive, unless he or she, or the employment, is excepted from the provisions of the Notifications of Vacancies Order,* 1952.

A LARGE Metallurgical and Chemical Company has several vacancies for **QUALIFIED ASSISTANTS** at its works in the North London area, engaged in non-ferrous process extraction. Applicants should possess a degree or equivalent qualification and consideration will be given both to younger applicants without industrial experience or to older men with previous experience. In addition to the salary the posts carry superannuation rights and marriage and family allowances. **BOX No. C.A. 3192, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

CHEMICAL ENGINEERS with some years experience in design work since graduation are required for The Caltex Group of Oil Companies to work initially in England with transfer abroad later. Salaries in accordance with qualifications and experience. Apply with full particulars to **THE UNITED OVERSEAS PETROLEUM COMPANY LTD., 30, OLD BURLINGTON STREET, LONDON, W.1.** quoting "**(QX)**".

FOR SALE

A number of lead lined and rubber lined **STEEL TANKS** for disposal from 3 ft. by 2 ft. by 2 ft. up to 10 ft. by 3 ft. 6 in. by 3 ft. 6 in.
Full details and prices from
WILLIAM R. SELWOOD LIMITED, CHANDLER'S FORD, HANTS. 'Phone 2275.

CHARCOAL, ANIMAL AND VEGETABLE, horticultural, burning, filtering, disinfecting, medicinal, insulating; also lumps ground and granulated; established 1830; contractors to H.M. Government.—**THOS. HILL-JONES, LTD., "INVICTA" MILLS, BOW COMMON LANE, LONDON, E. TELEGRAMS: "HILL-JONES, BOCHURCH LONDON," TELEPHONE 3285 EAST.**

FELSPAR, easily fusible, high alkali content Fe_2O_3 approximately 0.4 per cent, can be supplied lump or ground to any specification. About 200 tons available. Will sell at very low price to clear. **BOX NO. C.A. 3193, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

FORGED STEEL PRESSURE VESSEL, 44 ft. long by 4 ft. 3 in. i.d. by 4 in. thick. **WORKING PRESSURE,** 2,000 lb. p.s.i. **C. W. HOGG, 42, BUSHEY WOOD ROAD, SHEFFIELD.** Telephone: 72777.

GRAVITY Roller Conveyor several lengths, Rolls. 2½ in. diam. by 16 in. 3 in. centres. Good condition. **THOMPSON & SON (MILLWALL), LIMITED, CUBA STREET MILLWALL E.14.** (Tel.: East 1844.)

SCREENLESS PULVERIZERS for fine grinding of Chemicals. Also **CYCLONES, ROTARY VALVE FEEDERS. Callow (Engrs.) Ltd. Kirkby Trading Est., Liverpool.**

FOR SALE

ECONOMIC BOILERS—9 ft. diam. by 12 ft. 6 in. Foster Yates, 200 lb. w.p.; 8 ft. diam. by 14 ft. Paxman, 180 lb. w.p. Twenty others, all sizes.
NEW GALVANISED PIPING. Immediate delivery. Johnson Filter **PRESSES,** 25 in., 18 Frame, practically new.
FIVE new **FURNACE RETORTS,** 8 ft. diam., 6 ft. 8 in. deep, approx. 8 tons each. Welded Steel.
BENZOLE WASHER, lead lined, agitating gear, 7 ft. diam., 6 ft. 6 in. deep.
FIVE Dish-ended **NAPHTHA TANKS,** 18 ft. 6 in. long by 4 ft. 4 in. diam., two having agitators.
TWO 35 ft. long by 9 ft. diam. Lead-lined **TANKS.**
Stainless Steel **FILTER TANK, 3 ft. 6 in. diam.**
ONE Stainless **CONICAL HOPPER,** 7 ft. 3 in. diam., overall depth, 7 ft. 6 in.
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